RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

B.F.Goodrich grommet belts saved $250.00 a year

B. F. Goodrich grommet V belts cut costs 20 to 50%

THESE belts have to run 24 hours a day under terrific tension. Ordinary V belts used to snap in two, fly off this drive in only 4 months. In September 1950, B. F. Goodrich grommet belts were installed. They have already lasted 4 times as long as previous belts, still look good, and are saving over $250.00 a year in replacement costs. Here's why B. F. Goodrich grommet belts can be counted on to save on belt costs:

No cord ends—A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength—All of the cord material in a B. F. Goodrich grommet multiple-V belt is *concentrated* in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip—Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give ⅓ more gripping power, pull heavier loads with a higher safety factor.

Only B. F. Goodrich has the grommet!—No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). Now available in C, D and E sections. See your local B. F. Goodrich distributor. *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Grommet V Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

Nothing happens for weeks, months, even years at a time. So your Watchman gets lax. You get lax. Lulled by a false sense of security, you stretch your luck.

Then one weekend—SUDDEN DISASTER. Fire demolishes your plant. The work of a lifetime is reduced to rubble. Records show that more than 40% of burned-out plants never resume business. Your company could be among them.

There is little likelihood of disaster striking your plant on weekends—or during the week—if your Watchman is rigidly supervised by a DETEX tape-recording GUARDSMAN Watchclock. The GUARDSMAN gives you a minute-by-minute report of your Watchman's activities. If he sleeps, or skips rounds—you will know it mighty quick. The GUARDSMAN is especially vigilant on weekends and during long holiday closings—because it operates for as long as 96 hours, without the necessity of cutting the tape.

If you can afford to be complacent about weekend hazards to your firm's destiny, then you can ignore this message. But if you really want to insure dependable plant protection, write today for FREE GUARDSMAN folder. Better do it now.

DETEX
WATCHMENS CLOCKS
DETEX WATCHCLOCK CORPORATION
Dept. PE-6
70 VARICK STREET, NEW YORK 13, N.Y.
Sales and Service in All Principal Cities

PATROL
ALERT
ECO
NEWMAN
GUARDSMAN

'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Have You Included Everything?

SEVERAL INQUIRY cards have been received where readers failed to indicate the material desired or forgot to include their name and address.

It is important that you check the post card a second time before mailing it. Be sure that all the information you desire is indicated on the card and also that your name, company name and address are included.

Camera Aids Plant Engineers

I would like to offer my congratulations to PLANT ENGINEERING for the very timely article "Camera at Work—For the Plant Engineer" which appeared in the March 1952 issue. (The second part of this article was in the April issue.) Your presentation certainly proves the high value of photographs to the plant engineer in many phases of his work.

We have been trying to work out a method of reproducing various plant layouts by photographic means. Our problem is that of recording on paper in a minimum of time several alternate arrangements for a given department to allow a study of these arrangements by management. We are hoping that someday someone will perfect such a method of operation. *Robert J. Tucker, Jr., Plant Engineer, Patterson Mills Co., Inc., Roanoke Rapids, N. C.*

Bearing Standardization

A WORLD-WIDE system of standards for ball and roller bearings will be discussed by international standardization experts from eleven countries meeting in New York, June 16 to 26. The meetings will be held at Columbia University in conjunction with the second triennial General Assembly of the 33 nation International Organization for Standardization.

The project seeks to standardize terminology and definitions of bearings and bearing parts; nominal dimensions and tolerances of ball and roller bearings affecting their assembly with other machine parts.

ASTM Anniversary Meeting

TO ACCOMMODATE the large number of technical papers on the properties and testing of materials which are to be presented at the 50th Anniversary Meeting in New York, June 23-27, the American Society for Testing Materials has scheduled 30 technical sessions. In addition to these there will be in progress throughout the week the society's 10th Exhibit of Testing Apparatus and Laboratory Supplies and its 8th Photographic Exhibit. Headquarters will be at the Hotels Statler and New Yorker. All exhibits will be at the Statler.

The 30 symposiums and sessions will cover such subjects as: metals at elevated temperatures; continuous water analysis; paint materials; concrete durability; process control in ceramic whitewares; and others.

Personnel Changes

Raymond Chubbuck has joined Polaroid Corp., Cambridge, Mass., as plant engineer. Prior to this, he was assistant plant engineer at the main plant of the Bath Iron Works. At Polaroid he will be responsible for the planning and engineering of the company's plant expansion program.

John A. McMillan has been appointed plant engineer for Pittsburgh Plate Glass Company's Shelbyville, Indiana, plant. He was formerly plant engineer for Duplate Canada, Ltd.

Justin H. Libbey has been promoted to the office of works manager of Arco Co., Cleveland, Ohio, succeeding **Charles R. Hosken,** who has retired.

M. A. Simpson was recently appointed factory manager of the Granite City, Illinois, plant of Nesco, Inc. He was previously works manager for the Acme Metal Products Corp., at Blue Island, Illinois.

Bids Open to Small Businesses

ACCORDING TO A recent report, the local Air Force small business offices throughout the midwest have many requests for negotiated and advertised bids than at any time since last December. Regional offices are located in Chicago, Indianapolis, Milwaukee, Minneapolis, South Bend, and St. Louis.

There are other aids in the Air Force small business offices to help firms interested in subcontracting. List of prime contracts awarded each week, and lists of items needed by the Armed Services, including Navy,

(Continued on page 6)

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User Reports

ARMSTRONG "UNIT TRAPPING"

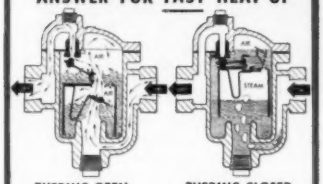
cut his fuel bill

20%

and speeded heat-up

15%

"BLAST" TRAPS PROVE TO BE ANSWER FOR FAST HEAT-UP



THERMIC OPEN THERMIC CLOSED

Where steam is turned on and off periodically, blast traps give really fast heat-up, provided accumulated air and condensate is pocketed and will be pushed out ahead of incoming steam. A large auxiliary thermic vent in the bucket opens when the trap is cold, letting air whistle right through trap. When trap reaches 210°F the thermic vent closes and trap operates as a standard trap (see drawings above). Blast traps are ideal for single pipe coils, small on-and-off unit heaters, on-and-off multiple coils, drip points, etc. See page 39 of The Steam Trap Book.

Experience of Greenhouse Owner Points Way to Greater Efficiency in Any Plant . . .

THE problem of operating steam heated equipment efficiently is basically the same whether you operate a greenhouse, a refinery or a food processing plant. That is why the experience of Reiss' Greenhouses, Minneapolis, should prove of interest and value to you.

By replacing old, inefficient steam traps on heating piping with an individual Armstrong "blast" trap on each coil, Reiss' cut its fuel bill exactly 20% and speeded-up heating of cold coils by 15%.

This benefit was gained solely because Armstrong traps drain condensate and air from steam heated units as fast as it accumulates and without leaking steam. In Reiss' case the "blast" traps described at the left were particularly beneficial, and may be in your case. For complete information call your local Armstrong Representative, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

You Get More Out of Your Fuel When You Use Armstrong "Unit Trapping"

SEND FOR YOUR FREE COPY OF THE 44-PAGE ARMSTRONG STEAM TRAP BOOK!

Complete data on selection of traps for all types of equipment plus installation and maintenance recommendations, trap list prices and physical data.

JUST CLIP THIS TO YOUR COMPANY LETTERHEAD AND MAIL:

ARMSTRONG MACHINE WORKS
912 Maple Sreet, Three Rivers, Michigan

Please send me The Steam Trap Book.

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Title_____

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Bids Open to Small Businesses

(Continued from page 4)

Army, and Air Force may be seen. For prime contractors seeking new supply sources there are lists of brochures of potential subcontractors, vendors, and suppliers.

New Plants Growing and Going Up

Pittsburgh Plate Glass Co. has opened a new plant in Baltimore, Md., for the manufacture of industrial brushes . . . **Racine Hydraulics & Machinery, Inc.,** formerly Racine Tool & Machine Co., has moved into a new plant at 2000 Albert St., Racine, Wisconsin . . . **General Electric Co.** has added three new buildings to the Transformer and Allied Products Division facilities at Pittsfield, Mass. All of the buildings are steel frame with protected metal sidings and steel sashes . . . **Allis-Chalmers Manufacturing Co.** plans a new building program to start soon at the La Porte, Indiana, works of the Tractor Division. The building will be used for manufacturing and storage, and an addition to the boiler house for a fourth boiler of 60,000 lb per hour capacity is in the plans . . . **Anaconda Copper Mining Co.** recently opened its new copper and brass warehouse at 4501 West North Ave., Chicago.

Instrumentation Symposium

THE AGRICULTURAL and Mechanical College of Texas has scheduled its 1952 Symposium on "Instrumentation for the Process Industries" for June 2, 3, and 4 at College Station, Texas, in the New Memorial Student Center, on the campus.

The program will include subjects related to the measurement and control of process variables, with recognition of new developments and current trends of the industry.

All interested persons are eligible to take this course, with payment of the $6.00 registration fee. Full information, including a program announcement folder, may be obtained from professor P. G. Murdoch, Chemical Engineering Dept., Texas A & M College, College Station, Texas.

Material Management Center

MANY INDUSTRIAL plants in Detroit are beginning to place greater emphasis on ways and means of reducing costs in handling and packaging the tremendous volume of materials that flow from their plants every year.

Plans have been proposed to establish a materials management center in Wayne University's School of Business Administration. **Don W. Kelsey,** chairman of the university's material handling committee, outlined how attempts are being made

'ROUND ABOUT

to raise $375,000 over the next five years to further the industry-education program. A contribution of $15,000 was received from Ford Motor Co. toward the center. In addition, Union Steel Products Co., Albion, contributed $2,000 and has pledged an additional $2,000 each year for the next four years.

The center will train employes of Detroit industrial firms in such varied facets of material handling as: procurement, packaging and preservation, layout and equipment development, handling, inventory control, quality control standards and grading, warehousing and storage loading.

Plant Engineer Club Activities

San Francisco: At a recent meeting of the San Francisco Society of Plant Engineers, officers for the coming year were elected. **E. F. Sullivan,** of San Francisco Naval Shipyard, was elected chairman, and **Fred Reiben,** of The General Metals Co., was elected secretary.

Chicago: The Plant Engineers Society of Chicago combined a visit to International Harvester Co., Farm Tractor Div., West Pullman Works, with their regular monthly meeting. Prior to the tour, **D. F. Redman,** plant engineer, pointed out the general layout of the plant with the help of a scale model which they have in their conference room. After the tour and a bite to eat, the men returned to the conference room to conduct their monthly meeting. After the meeting, there was a general discussion of what they had seen on the plant tour.

A. B. Pattou of Glidden Co. is scheduled to give a talk on paints and plant maintenance at their June 6th meeting.

How to Protect Company Records

AMERICAN businessmen are learning the lesson of proper record protection from the experiences of World War II allies, whose plants were devastated and vital drawings, production data and specifications destroyed in the inferno of bombing attacks.

Industrial concerns in the U. S. are setting up individual plans to forestall such occurrences here should an atomic attack take place. Exactly what these survival plans and methods are, is the subject of a new comprehensive book published by Diebold, Inc. Prepared and introduced to help all types of industrial plants in evaluating their particular record survival problems, the book may be obtained free, by writing Diebold, Inc., Flofilm Division, Canton 2, Ohio.

Free Booklet

tells how Tar Base Coatings can cut maintenance costs at *your* plant!

THIS 8-page maintenance guide is loaded with valuable information that can help you control corrosion and make an appreciable savings in plant maintenance. It tells you *where* cold applied tar base coatings can give your plant better protection at less cost . . . what grades should be used for specific applications . . . and instructions for application by brush or spray. ● Drop us a line on your company letterhead and we'll send you a copy without cost or obligation. *Write today!*

PITT CHEM 101
A versatile, heavy duty coating that withstands severest corrosive conditions.

PITT CHEM 102
A thin, high gloss maintenance coating for steel and concrete surfaces.

PITT CHEM 103
A heavy duty coating for metal exposed to corrosive vapors, dilute acids and alkalis.

PITT CHEM 104
A fast drying, high gloss coating for equipment handling potable water.

WBD 4194

PROTECTIVE COATINGS DIVISION

PITTSBURGH
COKE & CHEMICAL CO.

Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

Modern Power Centers

simplify change-over to higher voltage!

Section by section change-over of their plant from 220 to 440 volts was the deciding factor when a large Midwest steel fabricator installed Westinghouse Dry-Type Power Centers. But there were other considerations behind the move.

In the first place, operations had been growing steadily for the past six years, and plans called for further expansion. The old substations, having grown like Topsy, were trouble spots.

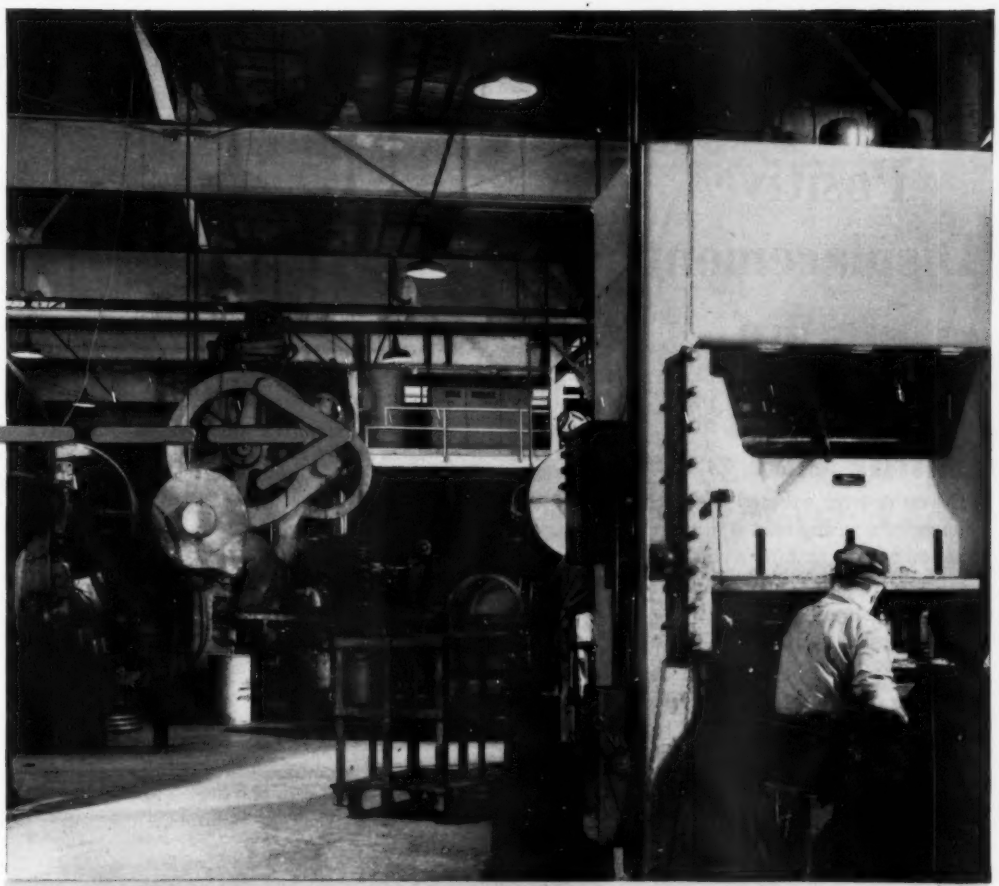
They chose Westinghouse Dry-Type Power Centers because the lightweight, compact units could be installed on raised platforms within the plant, close to the loads they serve. This eliminates the necessity for vaults, catch basins and flues which might impede the flow of work. Shorter secondary leads resulted in a copper saving that covered a good share of the installation cost. Shorter secondaries, too, reduced line losses, improved regulation.

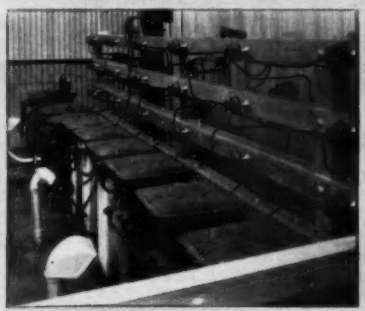
Installation of separate power centers, each serving its own area, made the change-over easy, without interrupting production in other sections. And the flexibility of the new power centers gives greater freedom for future expansion.

Check your own distribution system. You, too, may find excessive losses, poor regulation and outmoded equipment adding hidden operating costs. Your Westinghouse representative will be glad to show how you can make modern power centers pay. Call today, or write for booklet B-4428, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-70636

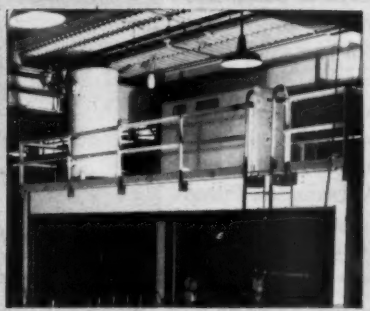
YOU CAN BE SURE... IF IT'S Westinghouse

POWER CENTERS





One of the outdoor substations which "just grew" as the load expanded, until they became costly, inflexible and inefficient. Modern power centers replaced these; eliminated their problems.



Westinghouse Dry-Type Power Centers, located on raised platforms close to the load they serve, provide maintenance-free dependability and economy, with flexibility for future expansion.

How do you know which

Positive Displacement Pump

is right for your job?

If you've ever suffered the consequences of a wrong choice in pumps, or if you're now making a choice and have some doubts, here's help.

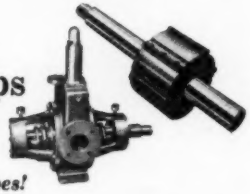
GET THE ADVICE OF A PUMPING SPECIALIST—a manufacturer who makes *all* types of pumps—including all types of positive displacement pumps—and is in a position to treat your problem objectively without the desire to sell you one type over others.

Worthington — oldest and largest pump manufacturer in the world — is equipped to do exactly this for you. With the most complete pump line to choose from, we can always find the one that fits your particular service conditions.

Write and tell us about your pumping problems. Be sure to give all pertinent details! Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Reciprocating Pump Division, Harrison, New Jersey.

The Worthington Positive Displacement Pump Line includes all these...

1. Rotary Pumps

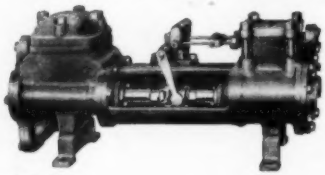


Both gear and vane types!

FOR VISCOUS LIQUIDS—SMOOTH, QUIET OPERATION. *Worthington Herringbone-Gear Pumps*, Types GA and GR; capacities from 1 to 5,000 gpm; pressures to 500 psi.

FOR NON-LUBRICATING, SLIGHTLY ABRASIVE OR CORROSIVE LIQUIDS. *Worthington Sliding-Vane Pumps*, Types VE and VR; external or internal bearings; capacities from 25 to 1,000 gpm; pressures to 200 psi.

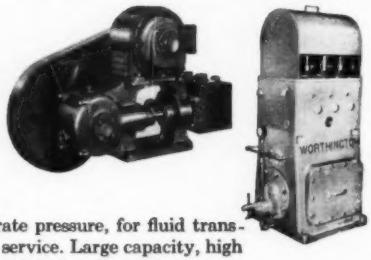
2. Steam Pumps



If you use steam, why not drive pumps with it?

Steam ends up to 250 psi maximum working pressure, hydrostatically tested to 375 psi. Hot-oil or cold-oil fitted. Simplex and duplex. All types: large and small; low pressure, high pressure; for general, boiler feed, refinery, steam heating and evaporator service.

3. Power Pumps



Up to 2,000 hp!

Small capacity, moderate pressure, for fluid transfer, refinery or general service. Large capacity, high pressure, for pipeline and hydraulic service.

P.2.7

The World's Broadest Line Assures You the Right Pump for Every Job

WORTHINGTON

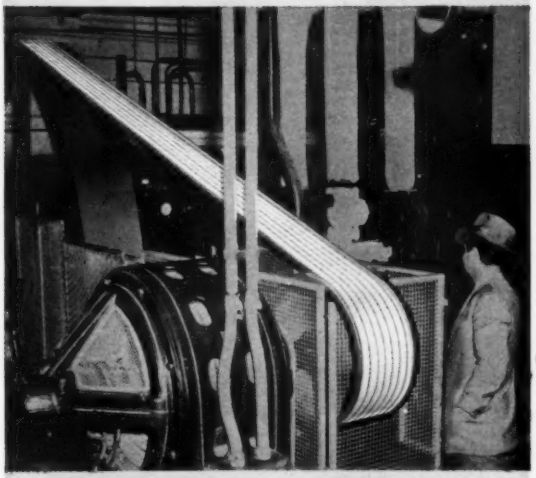
Reciprocating and Rotary Pumps

How concave sides cut V-Belt costs

Important to anyone who wants to cut V-Belt replacement costs is the simple, interesting reason WHY Gates Vulco Ropes are built with *Concave Sides* (U. S. Patent 1813698). See Figure 1.

When a Gates belt is bent around a sheave these Concave Sides fill out to full, even contact with the sides of the sheave groove. (Figure 1A). This gives you sure pulling power. And, naturally, because wear is distributed evenly, the Concave Sides actually give you longer wear—longer belt life. That cuts V-Belt replacement costs.

On the other hand, when a straight sided V-Belt (Figure 2) is bent, the sides bulge out, preventing the belt from fitting evenly in the sheave groove. This causes *extra wear* at the points shown by arrows. (Figure 2A).



Make this simple test yourself...

Hold a straight sided V-Belt as it would be bent around a sheave. Take the sides of the belt between your finger and thumb. You can *feel* the bulges in the sides—the bulges that prevent an even fit in the sheave groove and cause extra wear.

Now do the same thing with a Gates Vulco Rope. You can feel the sides fill out. You can see why they press firmly and evenly against the sides of the sheave groove—giving you longer belt life—lower belt costs.

When you buy V-Belts be sure to get Gates Vulco Ropes—the V-Belts with the Concave Sides.

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

SAVING $1,000 A YEAR

This big 18 foot flywheel on an ammonia compressor at the Terminal Warehouse Co., St. Joseph, Missouri, was originally driven by a flat belt.

Mr. I. McKee, plant superintendent says, "We needed a drive we could depend on, so we installed a Gates Vulco Rope drive right on the flat pulley of the compresser. This conversion is saving us about $1,000 a year."

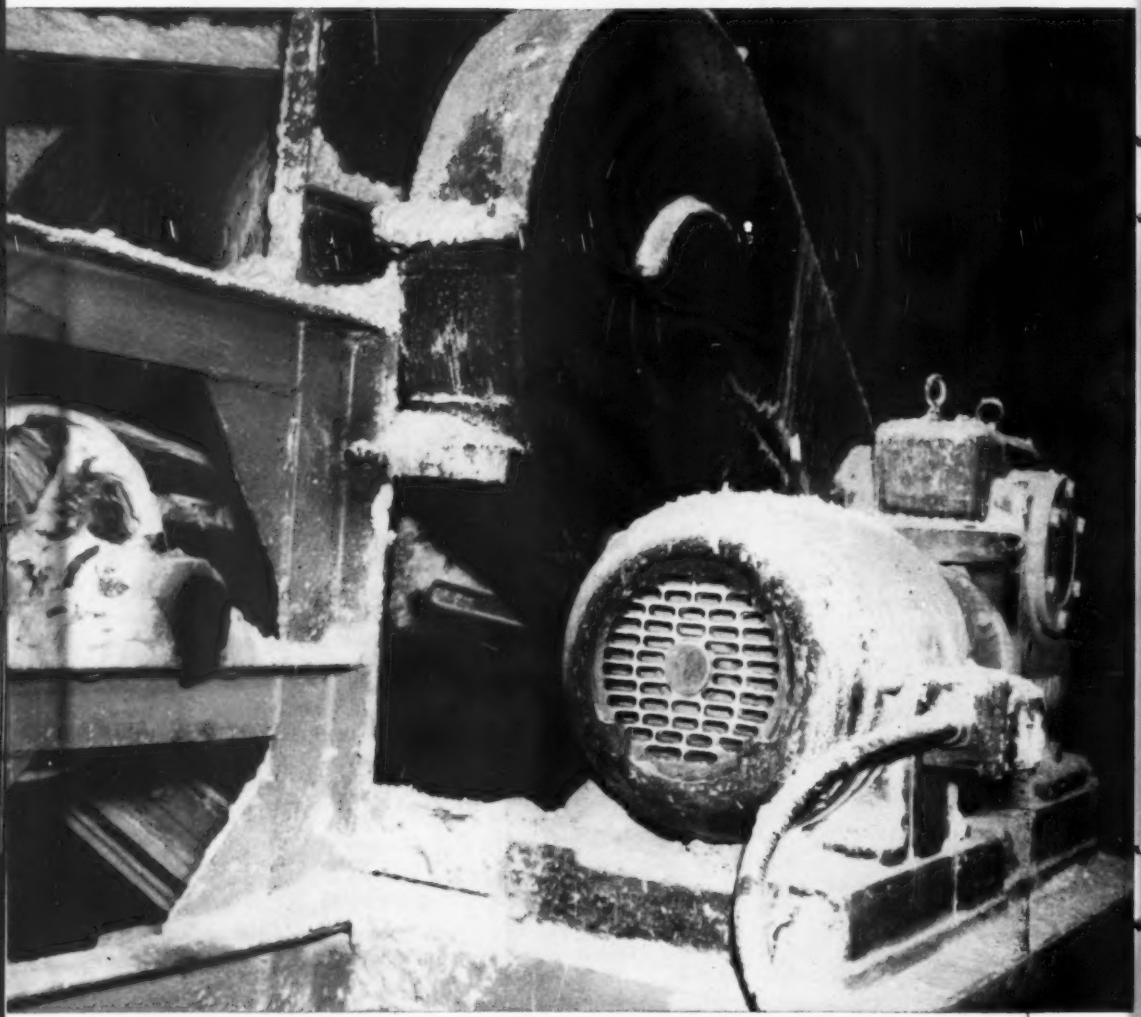
CS-526-A

Gates® VULCO ROPE DRIVES

THE GATES RUBBER COMPANY • DENVER, U.S.A.

V-Belts — Hose
Molded Rubber Goods
for industry
World's Largest Maker of V-Belts

INDUSTRY DOES THE



THE CHEMICAL INDUSTRY depends on standard, "off the shelf," Tri-Clad motors in the most adverse operating conditions, including corrosive, abrasive and explosive atmospheres. The 7½-hp totally-enclosed fan-cooled Tri-Clad motor above drives a crude ash conveyor an average of over 23 hours every day.

GENERAL ELECTRIC

752-12

TOUGH JOBS WITH TRI/CLAD MOTORS

REG. U.S. PAT. OFF.

EXTRA PROTECTION

Every Tri-Clad motor, open or totally-enclosed, is triply-protected against *physical damage, electrical breakdown* and *operating wear and tear.*

That's why you'll find general-purpose Tri-Clad motors in every industry—not only on the usual jobs which they do so economically—but on the *tough* jobs where unfailing performance is a must.

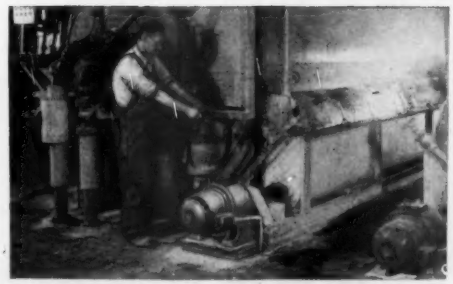
PROMPT DELIVERY

Today especially, delivery and service are important. G-E shipping points all over the country are ready to deliver most standard ratings right out of stock. And with the most complete service shop network in the motor industry you are assured of the best attention to motor problems.

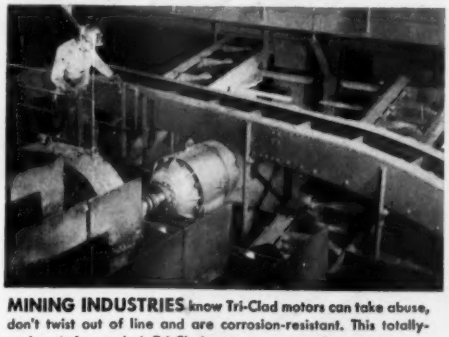
TIMELY INFORMATION AVAILABLE

If you are concerned with training manpower, the new G-E Motor Selection and Application Course, including nine strip films, is a unique and valuable aid. A sample copy of the "Instructor's Manual" (GEZ-310), which outlines the course, may be obtained on request.

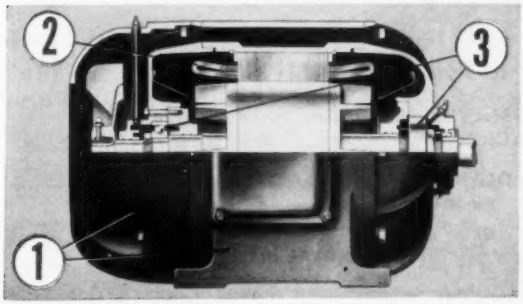
Also available is a free bulletin on "How to Maintain Motors and Generators" (GET-1202). Contact your local G-E sales office for any of the above material, or write *Section 752-12, General Electric Co., Schenectady 5, N. Y.*



FOOD PLANTS on "continuous process" operation depend on Tri-Clad motors to avoid costly shut-downs. Totally-enclosed, non-ventilated Tri-Clad gear-motor above drives a repulper in a sugar refinery.



MINING INDUSTRIES know Tri-Clad motors can take abuse, don't twist out of line and are corrosion-resistant. This totally-enclosed, fan-cooled, Tri-Clad motor runs a coal conveyor.



UNINTERRUPTED SERVICE under tough conditions is assured by many outstanding features of Tri-Clad totally-enclosed motors, for example: 1 rigid, cast-iron end shields and frame; 2 Formex* windings which resist oil, heat, shock, moisture, abrasion; 3 *completely* enclosed bearings that will last longer because provision is made for relubrication if necessary.

Reg. trademark of General Electric Co.

METAL WORKING FIELD likes Tri-Clad motors because they're easy to mount in any position, rigid and smooth running, and can *be relubricated if operating conditions warrant — without disassembly!* Six 7½-hp TEFC Tri-Clad motors run machine above which polishes, 500 to 1000 metal coffee-makers per hour!

STOP YOUR POWER LOSSES

With Compact, Positive DIAMOND ROLLER CHAINS

Rolling at Every Point of Contact

Horsepower at source, 100%—at Point of Use 98-99%

Diamond Roller Chains provide the perfect path for horsepower. They roll at every point of contact, deliver power at point of use with so little loss in transmission that it can scarcely be measured.

Power cost is therefore one cost you can cut — and because Diamond Roller Chains deliver without slip, — maximum speed for top machinery output is maintained.

Much helpful up-to-date information is included in Catalog 709. A copy will be mailed you on request.

DIAMOND CHAIN COMPANY, Inc.

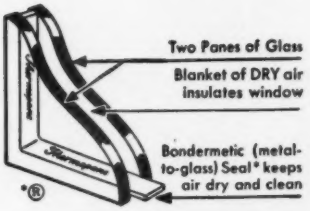
Dept. 614, 402 Kentucky Avenue, Indianapolis 7, Indiana

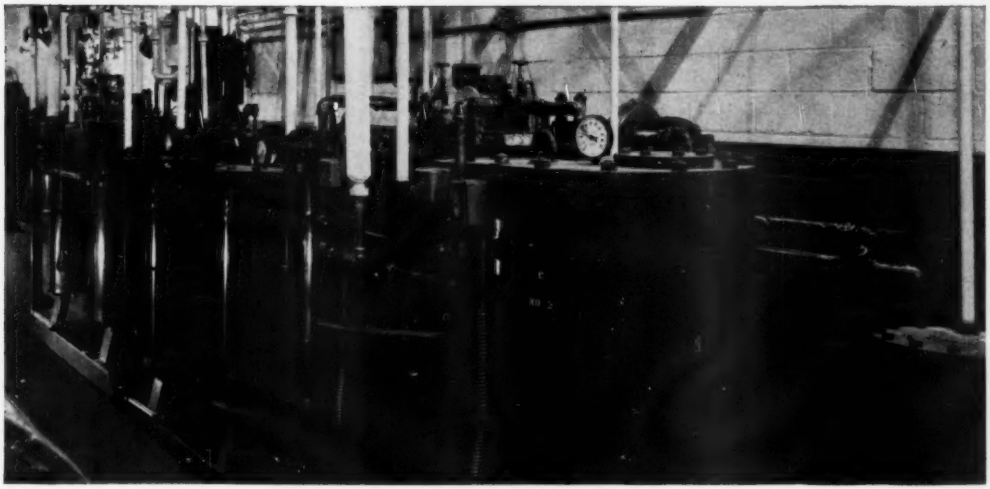
Offices and Distributors in All Principal Cities

Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND **ROLLER CHAINS**

L·O·F assembles DRY air and glass in making *Thermopane**





These three Lectrodryers in L • O • F's plant at Toledo, Ohio, DRY compressed air before it passes into their lines

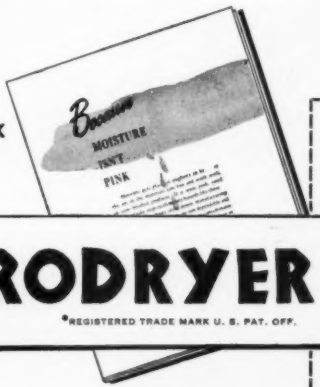
Air, permanently sealed between the glass panes, that makes *Thermopane* such an effective heat insulator, is DRY air. No moisture to cause fogging at low temperatures.

Libbey • Owens • Ford Glass Company obtains that DRYness by flushing the space between the panes with DRY air until all moisture is removed to a dewpoint below −30° F. Three Lectrodryers* DRY that air.

Even in "ordinary" plants, compressed air dried DRY by Lectrodryers saves time and money. No long waits while the water, that separators let by, drains out of air lines. No blushing, rust—or mud spotting when air is used for paint and enamel spray guns. No clogging of delicate instrument ports or excessive wearing of air-operated equipment.

Lectrodryer engineers will gladly help apply Lectrodryers to your compressed air systems. Write Pittsburgh Lectrodryer Corporation, 333 32nd Street, Pittsburgh 30, Pennsylvania.

MAIL THE COUPON FOR THIS FREE BOOK



LECTRODRYER

*REGISTERED TRADE MARK U. S. PAT. OFF.

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SERVICE CONTINUITY

ELIMINATES COSTLY PRODUCTION BREAKDOWNS

ISOLATES SYSTEM FAULTS

SAVES UP TO 63% ON INITIAL INVESTMENT

Direct-Acting Selective Overcurrent Trip Devices are available for I-T-E KA, KB, KC, and LG type circuit breakers in the following ratings:

15,000 to 100,000 amperes interrupting capacity

100 to 6000 amperes continuous

MODERN I-T-E DIRECT-ACTING SELECTIVE TRIP BREAKER PROTECTION

It's easy to protect production and profits against disastrous total power failure in complex electrical distribution systems. The cost is lower than you think.

Modern Selective Tripping—pioneered and developed by I-T-E—eliminates the failings of inadequate systems which can tie up an entire plant or utility with a single short somewhere along the line.

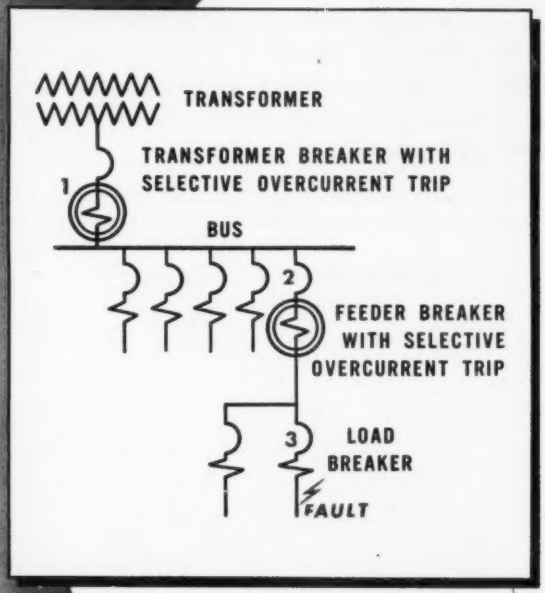
Selective Tripping limits the fault to *one* affected area only. Production continues—*uninterrupted*—throughout the rest of the system.

I-T-E TRIP DEVICE SAVES 63% ON INVESTMENT

Secret of this efficient delayed-action circuit breaker protection is the I-T-E *Direct-Acting* Selective Overcurrent Trip Device. Developed by I-T-E engineers to replace complex, expensive transformer-relay auxiliary apparatus, this unique tripping device gives one more reason for I-T-E leadership in the design and application of quality circuit breakers and switchgear.

Positive—compact—dependable, the low-cost I-T-E Trip Device saves you up to 63% on accessory cost per circuit! And because it is a *direct-acting* device—an integral part of the circuit breaker—no additional space is required on your switchboard panel. Assure service continuity. Install I-T-E Selective Tripping in *your* plant.

COSTS LESS THAN YOU THINK



HOW SELECTIVE TRIPPING WORKS

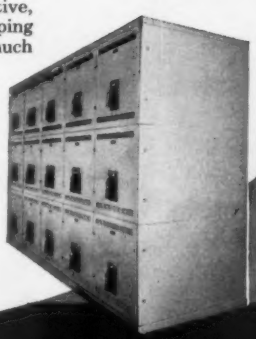
I-T-E circuit breakers, arranged in series, are *preset* to open in *definite sequence* (3, 2, 1 in diagram). If there is a sudden overcurrent or short circuit in any branch of the system, only the breaker (3) closest to the fault will open. Other breakers—other production machinery—in the system are unaffected.

ANOTHER I-T-E "FIRST"

Here is one more I-T-E "first"—another major I-T-E development to help industry protect production and save. Originally developed for the Navy during the War, the I-T-E Direct-Acting Selective Overcurrent Tripping Device has since been refined and perfected for industrial and utility use.

Call on I-T-E engineers—specialists in circuit breakers and switchgear—to see how positive, dependable I-T-E *Direct-Acting* Selective Tripping can protect your plant operation. See how much you can save.

For selection and application data on I-T-E large air circuit breakers, including selective tripping arrangements write for Catalog Section 1003 today. I-T-E Circuit Breaker Co., 19th and Hamilton Sts., Phila. 30, Pa.



I-T-E

LOW-VOLTAGE SWITCHGEAR

I-T-E CIRCUIT BREAKER CO. • 19TH AND HAMILTON STS. • PHILADELPHIA 30, PA.

CANADIAN MFG. AND SALES: EASTERN POWER DEVICES, LTD., TORONTO • EXPORT SALES: PHILIPS EXPORT CORP., N.Y. 17, N.Y.

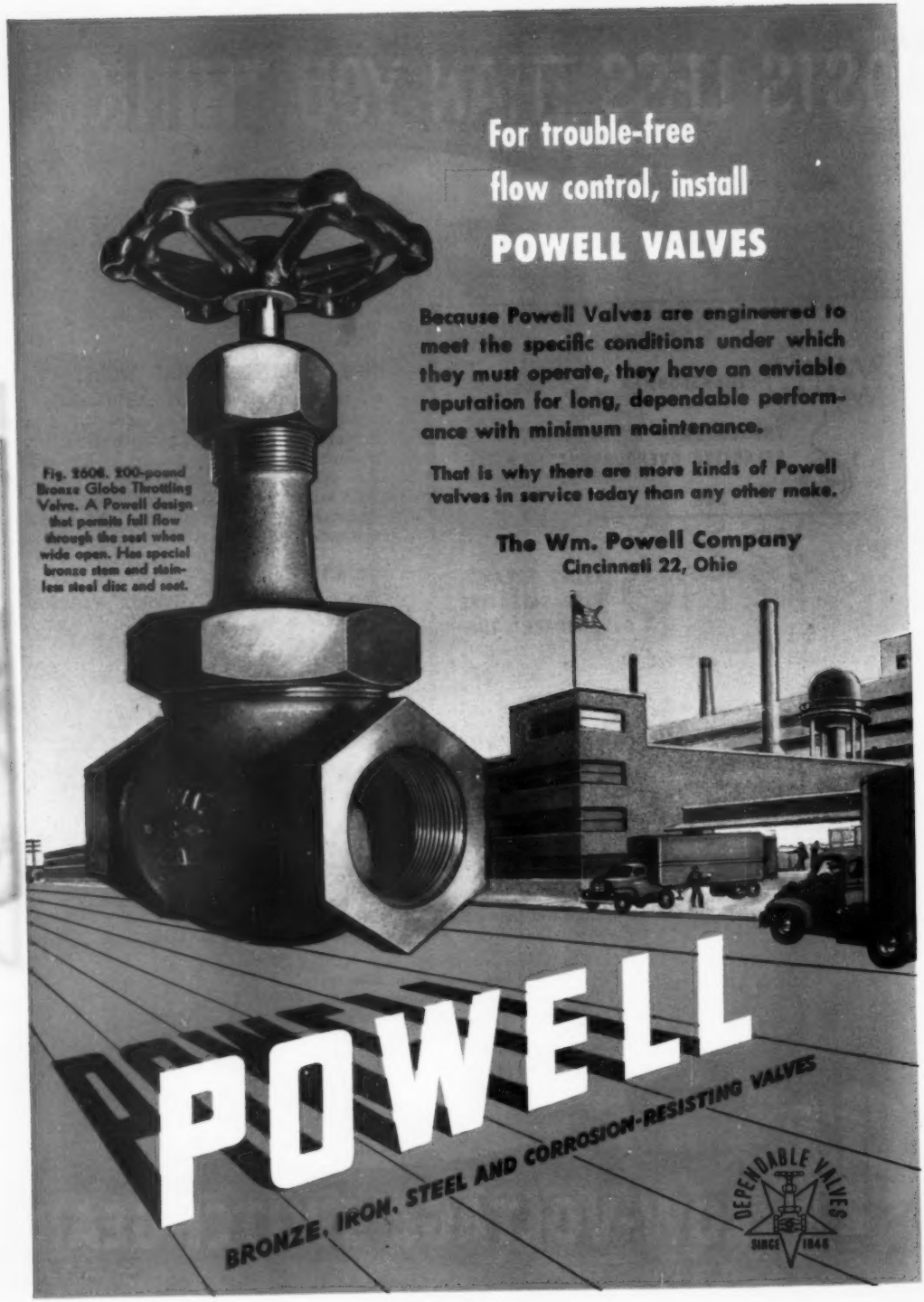

For trouble-free
flow control, install
POWELL VALVES
Because Powell Valves are engineered to meet the specific conditions under which they must operate, they have an enviable reputation for long, dependable performance with minimum maintenance.
That is why there are more kinds of Powell valves in service today than any other make.
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Fig. 2608. 200-pound Bronze Globe Throttling Valve. A Powell design that permits full flow through the seat when wide open. Has special bronze stem and stainless steel disc and seat.
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BRONZE, IRON, STEEL AND CORROSION-RESISTING VALVES
DEPENDABLE VALVES
SINCE 1846

Remember – the trade marks "tt" and "TUBE-TURN" are applicable only to products of TUBE TURNS, INC.

Engineered for efficient flow

EFFICIENT FLOW in piping systems is worth striving for . . . it saves kilowatt-hours and avoids over-investment in equipment. That's why, on this TUBE-TURN Welding Elbow, so much engineering attention is devoted to true circularity, smooth inner walls, and exact radius. They all contribute to minimum flow resistance and reduced pressure loss.

When you specify TUBE-TURN Welding Fittings and Flanges you are specifying careful engineering. Get in touch with your nearby TUBE TURNS' Distributor. You'll find one in every principal city.

Write Dept. D-5 for free booklet "Pipe and Fitting Materials" which gives specifications, properties and welding procedures for various materials.

Be sure you see the double "tt"

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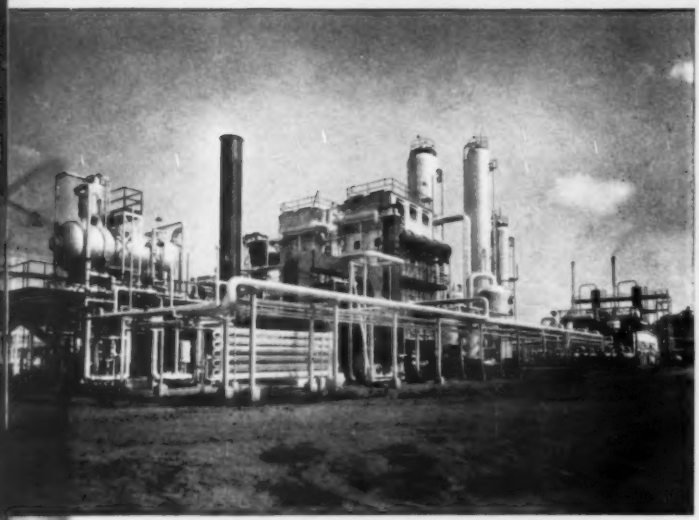
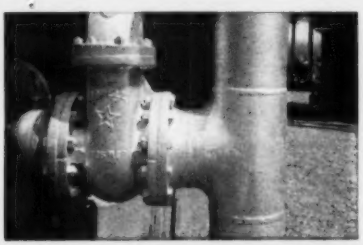
HOW CHEMICAL PLANT INSURES SAFE PIPING

Where leakproof piping is imperative... TUBE-TURN Welding Fittings are on the job!

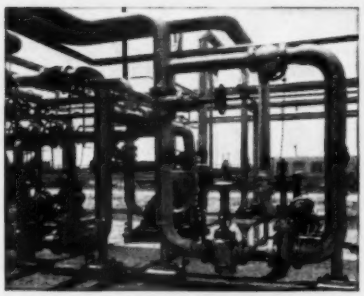
Design and installation of piping was simplified by obtaining all the necessary types of welding fittings from one reliable source. TUBE TURNS, INC. offers the world's broadest line of welding fittings and flanges—available in a wide range of types, sizes, and more than 40 different alloys.



Piping at new Mississippi Chemical Corporation plant handles explosive gases and acids at high pressures. That's why leakproof welded piping was specified, and TUBE-TURN Welding Fittings and Flanges used throughout. Process piping handles hydrogen, nitric acid, anhydrous ammonia, etc. Engineering and construction of entire plant, which produces synthetic nitrogen fertilizer, was handled by The Girdler Corporation.



125-lb. cast iron valve is secured to process line with TUBE-TURN Welding Neck Flanges. True circularity and uniform wall thickness of TUBE-TURN Welding Fittings, such as Welding Tee (right) and Welding Reducer (left) assure proper fit and speedy fabrication. Welders know they can depend on accurate line-up with TUBE-TURN Welding Fittings.



Welded piping using TUBE-TURN Welding Fittings keeps flow resistance and pressure drop to a minimum —an important consideration where so much piping is used. The complete Mississippi Chemical plant is noteworthy for high efficiency throughout . . . unit energy input is lower than in any other similar plant.

Want Materials Data?

Tube Turns, Inc. has prepared a booklet giving specifications, properties, and welding procedures for different pipe and welding fitting materials. If you'd like a free copy just send this coupon.

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TUBE TURNS, INC.

LOUISVILLE 1, KENTUCKY

NEW! NEW!

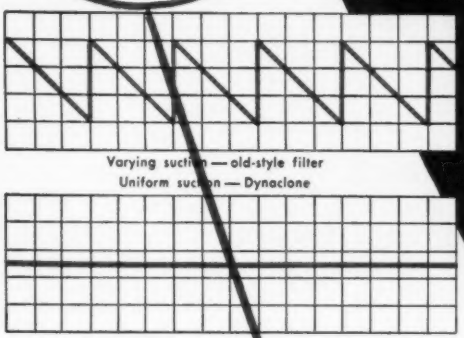
NEW Cloth Screen Dust Filter

SLY DYNACLONE

You saw this ad 2 years ago

offers 5 NEW ADVANTAGES!

1. Eliminates mechanical shaking.
2. Provides uniform suction at dust source.
3. Assures longer bag life . . . 4. minimum maintenance.
5. Keeps itself automatically and continuously clean without additional power or equipment.



Varying suction — old-style filter
Uniform suction — Dynaclone

Send for descriptive bulletin just out on the new Sly Dynaclone — the ultimate in filter performance.

This revolutionary new dust filter is another Sly first. Extremely simple and thoroughly dependable, it eliminates entirely the gremlin of mechanical shaking and provides uniform suction of air at dust source.

This uniform suction is achieved by a simple device which cleans the filter bags successively by a reverse flow of air—the same suction which draws the dust onto the filter cloth is reversed to blow it off.

Since this reverse air suction operates continually, the new Sly Filter requires no shutdowns for removing dust from the cloth.

No mechanical shaking or flexing device is needed, eliminating all strain and wear.

The Dynaclone isn't NEW any more! It has been quietly at work in many industries with results beyond hopes and expectations.

The result of long experimentation and exhaustive tests, the Sly Dynaclone has thoroughly proved itself. It provides substantial savings over any other type of cloth screen dust collection. Write for complete information.

*PATENTED

SLY PIONEERS and LEADERS in INDUSTRIAL DUST CONTROL

THE W. W. SLY MANUFACTURING CO.
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Don't Bargain-Shop for Service . . .

A part that doesn't fit or function right is poor tonic for your electrical apparatus. That's why Replacement parts can become expensive headaches. They may *replace,* temporarily . . . but they won't *renew* your equipment. Good service economy, rather, calls for a Renewal Part—precision engineered, and designed specifically for the original apparatus.

That's why Westinghouse backs *all* new equipment with a full line of Genuine Renewal Parts. They are precision built—on the same machines that turn out parts for original apparatus. They contain the latest materials and improvements, developed by a multi-million dollar Westinghouse research program. You benefit by getting a *better* part—often better than the one designed for the original equipment.

Westinghouse stocks parts in 31 Renewal Parts Warehouses over the country. This network speeds deliveries . . . helps you with inventory control . . . makes it easy for you to carry frequently used parts.

Renewal Parts, however, is only one phase of the complete Maintenance Service offered by Westinghouse. It also maintains 36 Repair Plants, where all kinds of electrical apparatus is repaired . . . and 46 Field Service Offices to make inspections, adjustments and on-the-spot repairs for equip-

CALL WESTINGHOUSE FOR A COMPLETE MAINTENANCE SERVICE

SEE TELEPHONE LISTING ON PAGE 34

There's a difference between replacement and renewal parts!

ment that cannot be moved easily.

These services are backed by factory-tested methods, factory-approved materials, factory-trained specialists. They provide the finest in *service protection* . . . the best in *service economy*. Your proof is in the performance of the finished job.

For more information, write today for a free copy of Westinghouse Maintenance booklet, B-4766. It's loaded with facts and illustrations covering the complete Westinghouse Maintenance Service. Send your request to: Maintenance Sales Dept., Westinghouse Electric Corp., East Pittsburgh, Pennsylvania. J-95157

. . . MATCHED TO YOUR NEEDS

YOU CAN BE SURE . . . IF IT'S
Westinghouse

COMPLETE MAINTENANCE SERVICE

SHOP REPAIR FIELD SERVICE
GENUINE RENEWAL PARTS

ALLIS-CHALMERS

Release these

FOR FULL

UNIT SUBSTATIONS

Men

PRODUCTION

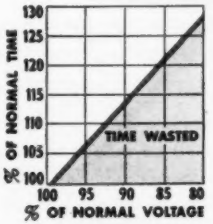
HOW MANY WORKERS in your plant are tied to low producing machines . . . turning out less work than they should because undervoltage cuts machine output? And how many more are slowed down on benchwork, layout and inspection because undervoltage pulls illumination below adequate levels? Even properly designed distribution systems may no longer be sufficient because of new machinery that has been added and production schedules that have been stepped up.

When your plant operates at 10% undervoltage, torque available from squirrel-cage motors driving production machines is 19% below normal . . . infra-red bulbs take nearly 20% longer to deliver rated amounts of heat . . . workers take up to 25% longer to do their jobs and accident rates are high because illumination levels drop as much as 30%.

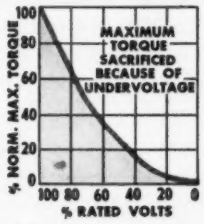
Recruit manpower from within your own plant by getting rid of low illumination levels that rob worker efficiency. Recover production time wasted by slow producing machines. Install Allis-Chalmers LCS Unit Substations at load centers and eliminate excessive line drop by shortening low voltage cables.

You can count on the cooperation of experienced Allis-Chalmers substation engineers in working out your distribution system. Allis-Chalmers LCS Load Center Unit Substations are neat, compact, easy to install and provide protection to personnel. Get in touch with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin for bulletins 11B6285A, 11B6325B, and 11B6895. A-3373

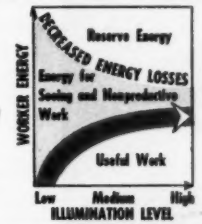
HOW UNDERVOLTAGE WASTES MAN-HOURS . . . CUTS PRODUCTION



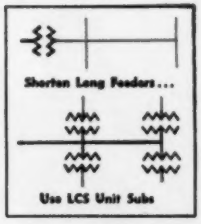
TIME IS WASTED when undervoltage is distributed to infra-red bulbs and other heating devices. It takes longer to deliver the same amount of heat . . . longer to do a given job. In one plant, for instance, drying time for black-painted sheet steel was increased from 11 minutes to 18 minutes by a 10% reduction in voltage.



JOBS TAKE LONGER because torque and horsepower drop when voltage drops. Less torque means lighter cuts on lathes, shapers, drill presses, and other machine tools. Motors overheat on undervoltage, burn out faster. More time must be spent on each job. More overhead . . . more man-hours have to be figured into every job.



WORKERS SEE BETTER, produce more when full voltage is maintained. Illumination was increased from 6 to 16 ft. candles (equal to an increase from 83% to full voltage) . . . resulting in a 9% increase in production, 20% decrease in accidents. In another case, production increased 25% with improved illumination.



A MAJOR CAUSE of undervoltage is the voltage drop in secondary feeders. Long lines of heavy copper carrying power at low voltage may prove inadequate as production schedules are stepped-up and new machines added. Install Allis-Chalmers LCS Substations at load centers to reduce voltage drop and increase production.

ALLIS-CHALMERS

CAUGHT for heat

Gas Machinery Company

HEAT? Instead of using metal rollers, the manufacturer of this annealing furnace applied a Super Refractory roller-hearth. As a result, the hearth stays straighter, lasts longer, and reduces marking and pick-up.

ABRASION? The skid rails supporting these brass billets were formerly made of alloy. The alloy skids required complete replacement every two to five weeks, constant maintenance between times. When replaced with Super Refractory skids, the new rails required *no attention* for *over three years.*

CORROSION? An interesting application of Super Refractories where no heat is involved is this wire guide. It supports newly drawn steel wire as it passes along the bottom of a tank during zinc coating. It seems to be the only material that will stand up at all under the cutting action of the wire and the corrosive action of the plating solution.

Here's a group of materials often used in place of certain metals—Super Refractories by CARBORUNDUM. Possessing properties seldom associated with refractories, these materials have often proved superior to the metals they replaced; have been invaluable where critical nickel, chrome, or cobalt alloys were involved.

For example, Super Refractories have replaced metals for such diverse applications as: skid rails, muffles, wire guides, radiant tubes, roller hearths, hot blast mains, brazing fixtures, recuperator tubes, etc. In these cases, they not only *released* vitally needed metals but *outperformed* them (by lasting longer than the metals — while also increasing the capacity of the equipment).

As you look over the properties of Super Refractories listed opposite, draw a mental comparison with your needs. Exactly what makes an alloy essential in this place, or that? Is it refractoriness? conductivity? abrasion? corrosion? strength? It's surprising how often you'll find Super Refractories inherently better — and far less expensive — than metals.

It will pay you to investigate these interesting Super Refractories . . . *now*, before the metals cupboard is bare. Won't you write or call us today?

Super Refractories by

CARBORUNDUM

TRADE MARK

Refractories Division

The Carborundum Company, Perth Amboy, N. J.

"Carborundum" is a trademark indicating manufacture by The Carborundum Company

IN THE SQUEEZE resisting metals?

SUPER REFRACTORIES ARE IDEAL WHERE

HIGH HEAT IS INVOLVED. Super Refractories are very strong and durable—can be safely used at temperatures over 3000 F. Compare this with 25-12 chrome-nickel steel, for example, which loses strength rapidly over 1500 F. and cannot be used with safety above approximately 2100 F.

ABRASION OR EROSION ARE PRESENT. Two types of Super Refractories are within one index point of diamond hardness! They are the toughest known materials for large scale commercial use. They will distinctly outwear metals—especially at furnace temperatures.

HEAT CONDUCTIVITY IS NEEDED. At elevated temperatures, one Super Refractory material conducts heat *almost as rapidly as chrome-nickel steels.* It's widely used in equipment involving heat transfer. There are also Super Refractories which are good insulators, particularly at high heats.

STRENGTH IS IMPORTANT. Super Refractories are generally very strong, and *retain* their strength at temperatures where metals become unusable. For example, the modulus of rupture of one composition averages 3100 psi, at 2460 F. No commercial tonnage refractories have greater strength.

CHEMICAL ACTION IS PRESENT. In general, most Super Refractories are either neutral or acid in nature—are widely used where chemical inertness is important.

SPECIAL SHAPES ARE INDICATED. Practically all Super Refractories are available in a wide variety of construction shapes molded to close tolerances—including fitted joints, tubes, etc.

USE THIS BOOKLET TO CHECK UP. This new booklet contains an easy-to-read analysis of the principal characteristics of these unique Super Refractories. The coupon will bring you the story—or one of our engineers will be happy to talk over your problems. We believe it could be mutually profitable.

Dept. Z62
Refractories Div., The Carborundum Co.
Perth Amboy, New Jersey

Please send me your free booklet on the properties of Super Refractories.

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PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by E. B. Skubik

Outside Air Follows Crane Cab

THE MAJOR function of Bethlehem Steel Co.'s industrial hygiene staff is to investigate health hazards that may occur in plants, shipyards, or other operations and to assist in the development of proper engineering and other measures to eradicate any undesirable conditions.

One development in which this staff participated is an example of the type of studies being made.

This is a system for supplying fresh air to crane cabs. Installations in the blowing-engine house and in the gas-electric building at the Sparrows Point plant are giving highly satisfactory results.

Wall duct supplies fresh air to cab regardless of rail position of crane

With a zipper system, outside air is supplied to the crane cab no matter where it may be operating. The crane operator is therefore always separated from the atmosphere of the building and is completely protected from any dust or smoke that may be present.

Fresh air is blown into the duct by a fan at one end, and the operator can regulate the flow into his cab by means of a valve at the entrance end of the duct. Means for heating the air during the cold season are also provided. *From Bethlehem Review, published by Bethlehem Steel Co., Inc., Bethlehem, Pa.*

Helical Carbide Cutters

SINTERED CARBIDE cutting edges came into use just before the last world war. Like other manufacturers, Boeing adopted carbide cutters immediately and has been using them ever since.

The problem of the helical carbide cutters arose when it was found that carbide manufacturers did not make inserts shaped to fit helical tool bodies. Nor was there much information available which could have led to the making of helical carbide cutters. Data on helical high speed cutters, formerly used in aircraft machining, did not exactly apply to carbide.

For these reasons the company established a carbide-development group where all carbide cutter problems could be worked out—with the aid of other portions of the organization.

The work began with the successful bending and twisting of a standard carbide insert so it fit a helical tool body. This was done by placing one end of a carbide bar in a vise, grasping the other end with a pair of pliers, heating the bar to a temperature of 2200 F, and gradually twisting it the desired amount. Then the pliers were used to bend the bar edgewise. This bending and twisting was very difficult to perform.

Consequently, the carbide-development men designed a mechanical bender-twister, to work inside the turns of an electronic induction-heater coil. In this manner, with the heat developed internally in the carbide itself, the temperature could be raised quickly to the correct value

Record Cards Tell the Story About Equipment

EVERY PIECE of equipment operated by Bechtel Equipment is covered by a "medical history" form. This has a minimum of entries yet provides all the essential facts.

Red tape elimination was necessary; otherwise, keeping the status of 1750 inventoried units would be a staggering and expensive task. At one time this equipment was scattered over 14 states. Each time an over-the-road rig is moved to a new state, licenses must be obtained—all in a day's work for the men who herd the company's mechanical horses.

The cards trace the life history of a piece of equipment from purchase to sale. Some of the information they report is: description; engine and serial numbers; date acquired; vendor; purchase price; license data; depreciation and rental record; major repairs and operating expense; sales record. A summary report, prepared monthly, is reviewed by top company executives. *From Bechtel Briefs, published by Bechtel Corp., San Francisco, Calif.*

DESCRIPTION: D7 Caterpillar Diesel Tractor — ENGINE NO. — EQUIPT. NO. 11-65

Arrangement 7B 9435, 7B 1713 heavy duty track roller guards, 4F 1867 lighting system, 3F9549 starting system, 7B 4373 crankcase guard, 7B 4464 Front Pull Hook, MD 7 Trackson Pipelayer w/35000# counterweight. Serial MD7-681.

PURCHASE RECORD / INVOICE RECORD

DATE ACQUIRED	NEW USED	VENDOR	P.O. NO.	V.O. DATE	V.O. NO.	PURCHASE PRICE	FREIGHT	TAX	TOTAL COST
10-8-47	N	John Doe Equip.	ME 1050		MD11-5	13142.38		226.06	13368.44

LICENSE DATA

YEAR	STATE	NUMBER	COST	TITLE NO.

SALES RECORD

DATE SOLD 9-21-49 TO Pacific Tractor & Equip. Co.
SALES PRICE $ 8,500.00 1212 Washington Ave.
BOOK VALUE $ 2,962.71 Los Angeles, Calif.
GAIN OR LOSS $ 1,537.29
REMARKS Inv. No. 715 dated 9-21-49

ITEM: D7 Caterpillar Tractor w/Pipelayer — SERIAL NO. 3T 6612 — EQUIPT. NO. 11-65

FORM 11248 — REPAIRS & OPERATING EXPENSE — 11-65 — PAGE 1

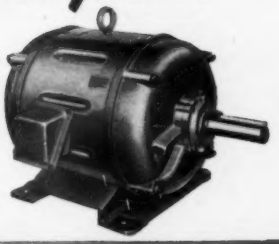
DATE	REF	DESCRIPTION AND LOCATION	REPAIRS	MAINTENANCE	INSURANCE	LICENSE & TAXES		TOTAL	TOTAL TO DATE
7/11/48	Dodo	Misc. labor & Material	20 20						20 20
8/4/48	Geo.	Strut Rock Guard & Misc. labor	57 00						77 20
9/24/48	Geo. Co.	Ad. Mitra	1 60						78 80
7/24/48	8239	Paint, misc	42 11						120 91
7/24/48	8255	Labor to transition Sideboom	28 00						148 91
7/24/48	Riddle	Labor Body, incl paint misc	180 28						329 19

This card presents an actual case history of one of the company's pieces of equipment. Depreciation and rental information portion has been deleted

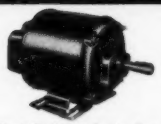
Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

Wagner Quality Motors *for your product or your plant*

When you select a motor from Wagner's complete line, you get a motor that is completely dependable in its specific application. You can choose from a wide variety of types and sizes. Here are a few of the motors in the Wagner line. At right is TYPE RP—open type polyphase squirrel-cage motor. It is drip-proof and suitable for all general purpose applications. 1/6 to 400 hp.

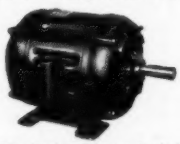


SINGLE-PHASE

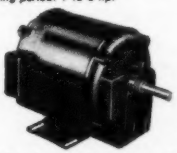


TYPE RB—*Split-phase Induction. For easy starting applications with high starting current. 1/20 to ½ hp.*

TYPE RX—*Capacitor-Start Induction. For general purpose applications requiring high starting torque—normal starting current. 1/6 to 3 hp.*

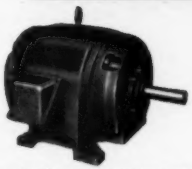


TYPE RG—*Repulsion-Induction. For high starting torque applications involving a very long starting period. 1 to 5 hp.*



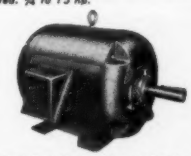
TYPE RA—*Repulsion-Start Induction. For general purpose applications with high starting torque—low starting current. ½ to 15 hp.*

POLYPHASE MOTORS



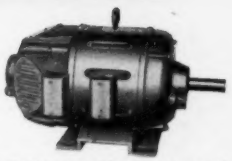
TYPE XP—*Splashproof. Protected against splashing or dripping liquids. ¾ to 200 hp.*

TYPE TP—*Totally-enclosed, non-ventilated. Fully protected. ¼ to 15 hp.*

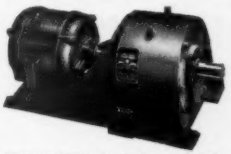


TYPE CP—*Totally-Enclosed Fan-Cooled. Protected against dirt, chips, abrasives or fumes. Steel frame. 1 to 250 hp. Also in explosion proof type HP.*

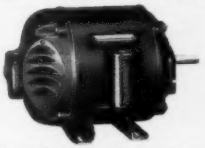
TYPE EP—*Corrosion-resistant Totally-Enclosed Fan-Cooled. Cast iron frame. 2 to 250 hp. Also available in explosion proof type JP.*



TYPE RS-1—*Wound Rotor. Constant or adjustable varying speed. 1 to 250 hp. TYPE RS-2 for intermittent service. 2 to 200 hp.*



GEAR MOTORS—*Single-phase or Polyphase. Open or enclosed types. 1/20 to 50 hp.*



DIRECT CURRENT MOTORS—*Companion line to Wagner A.C. Motors. 1/6 to 3 hp.*

* * *

In addition to a complete line of motors, Wagner also furnishes Increment Type Motor and Starter Combinations, Jet Pump Motors and a complete line of Transformers: Dry-type, Distribution and Power. Wagner engineers welcome an opportunity to serve you. Consult the nearest of 32 Branch offices, or write direct.

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AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

2204

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

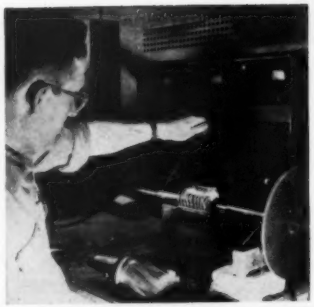
and held there automatically during the bending and twisting.

The new helical carbide cutters reduce the time previously needed for machining, and reduce it tremendously. Take, for example, the 1½ in. wide by 76 ft long and from 0.625 to 0.400 in. deep cut that must be made on one wing stiffener.

Using the old type of helical cutter, two passes were required at 50 in. per min for an approximate machining time of 45 min. With a straight edge carbide cutter this time was cut to about 20 min, with a feed of about 80 in. per min. This was an improvement.

But with the helical carbide cutter the job is whisked through in 7 min. Only one pass through the mill is required and, when finished, the cut has a 100-micro-inch finish.

Maintenance (number of times the tool must be removed, sharpened,



Induction coil supplies heat and Boeing designed tool twists and bends carbide insert to the proper helix angle of cutter

etc.) on helical carbide cutters is much less — in spite of the 3600-10,500 rpm speed range at which they turn—than it was previously. *From Boeing Magazine, published by Boeing Airplane Co., Seattle, Wash.*

Expansion Valve Selection

THE CORRECT sizing of thermal expansion valves will help insure full output of the refrigeration system—reduce expansion valve wear—and maintain maximum evaporator efficiency during fluctuations in the cooling load.

In order to select the correct size expansion valve for a refrigeration system, it is necessary to know the pressure differential at the valve. This differential is simply the figure obtained by subtracting the low side (LS) from the high side (HS) pressure existing on either side of the expansion valve. Once this pressure has been calculated, the valve can be selected from manufacturer's tables.

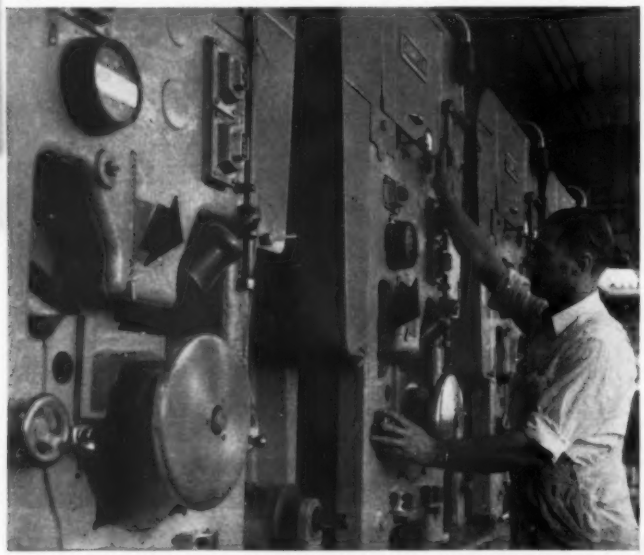
For example, a 40-ton system has a 91 psi differential at the expansion valve (or where an expansion valve would be located if installed). Going to the manufacturer's tables, a valve with a 40-ton, 91 psi differential would be selected. This valve will pass that weight of liquid refrigerant which, when changing to gas in the evaporator, will absorb the equivalent heat of 40 tons of refrigeration.

The all-too-popular, rule-of-thumb technique of arbitrarily assigning 60 psi as the differential for all thermal expansion valves can lead to a costly loss in refrigeration capacity. If the 60 psi figure, or any other pressure differential, is too low, the valve will be over-sized

Continued and Safe Press Production Assured by Built-in Extinguishing System Offering Fast Fire Control

THE FLAMMABLE gravure inks and solvents used to print Beech-Nut chewing gum wrappers have always been considered hazardous at the company's Canajoharie, N. Y. printing plant. Should the inks ignite, the work of printing over 1,000,000 wrappers and cartons an hr would grind to a halt. Severe damage could be done to the presses and the plant itself threatened.

To guard against these possibilities, explosion-proof motors and switches are installed in the press areas. Static collectors and grounds guard against the build-up of dangerous charges and an accumulation of volatile gases is prohibited by a superior ventilating system. Numerous portable extinguishers are strategically placed about the pressrooms.



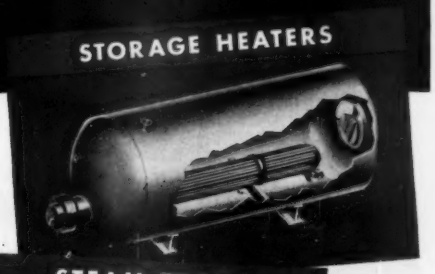
Carbon dioxide nozzles are attached to each press unit and aimed at the ink rollers. Should fire flash, inert gas will completely envelop the printing press

Even with these safeguards, management felt that the presses and mixing tubs should have automatic, built-in, fire extinguishing systems so that in any unforeseen emergency, complete protection would be available.

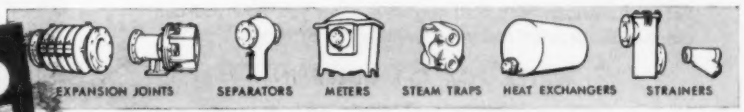
Company specifications for the system required that no damage be done to the presses or work-in-process and that there be a minimum of delay in restarting the presses with a speedy end to any fire, leaving no mess to be cleaned up.

A carbon dioxide system was designed which fitted every qualification and which could be both automatically and manually operated. If fire occurs, temperature-rate-of rise detectors, mounted throughout the presses, trip a bank of cylinders. The released gas surges from the cylinders, operates a pressure switch which shuts down the presses, and is discharged from nozzles on the press in trouble. Robbed of its oxygen, the fire is snuffed out in seconds. *From Kidde Industry, Published by Walter Kidde & Co., Inc., Belleville, N. J.*

ADSCO INSTANTANEOUS HEATERS



Choose ADSCO when you want a dependable instantaneous heater. For ADSCO specializes in instantaneous heaters, making all types in any size you need. Heater shells are seamless steel pipe, carefully cut and welded. Tube bundles of pure deoxidized seamless copper tubing formed into U-bends. Semi-steel covers are high-tensile, fine-grained castings. ADSCO heaters are ideal for general service hot water, process work, swimming pools, dishwashing machines... Write for ADSCO's new fact-filled, 56-page bulletin. The most complete, authoritative publication in the industry.

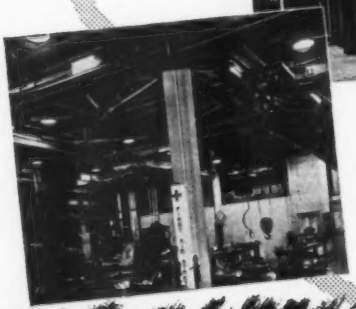


ADSCO
75 YEARS OF LEADERSHIP

AMERICAN DISTRICT STEAM COMPANY, INC.
NORTH TONAWANDA, NEW YORK

Railmaster 3-ton crane serves the paint shop area and interlocks via track curve with crane serving the sand blast room. Interlocking track is equipped with opener to allow fire door closure.

Track and switches with spur tracks over welding booths for easy spotting of heavy loads in booths.



Compact track and crane system over the electrical shop area. Note hand chain drop section on extreme left, which lowers a hoist carrier for service or repair.

MONORAIL REDUCES *Maintenance Costs*

In this, one of the country's largest maintenance shops, American MonoRail Overhead Handling Equipment serves the entire department. Included in the department are: machine shop, electrical repair, metalizing room, welding, painting and sand blast room, pipe shop, and inside and outside storage. This plant has shown a definite increase in efficiency and a great reduction in handling costs.

Let an American MonoRail engineer show you how you can cut handling costs and save valuable floor space.

WRITE FOR C-1 BULLETIN

THE AMERICAN MONORAIL COMPANY

13123 ATHENS AVENUE ● CLEVELAND 7, OHIO

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

and tend to "hunt," causing fluctuations in the amount of refrigerant fed to the evaporator. An over-sized valve will admit more than the required amount of refrigerant and cause erratic evaporator operation.

This is because an expansion valve is essentially an orifice. The size orifice selected (for any given tonnage) depends on the pressure differential. At the correct differential the orifice will pass the amount of liquid refrigerant needed to satisfy the load on the evaporator.

If the orifice is too large because the valve was selected for too low a differential, it will pass too much liquid refrigerant each time the valve opens. If the orifice is too small because the differential was figured too high, the expansion valve will not pass sufficient refrigerant, "starving" the evaporator and reducing the system's capacity. *From an article by M. L. Hoglund, in Trane Weather Magic, published by the Trane Co., La Crosse, Wis.*

Stainless Mesh Dries Gases

STAINLESS STEEL wire as fine as 0.0035 in. in dia is being fabricated by the Otto H. York Co., Inc., of East Orange, N. J., into a unique knitted wire mesh that has dozens of applications in the chemical and petroleum industries.

This wire mesh differs from the familiar woven mesh in that it is formed of uniformly interlocked wire loops. The peculiar structure gives the mesh an unusual combination of properties.

What makes this knitted mat so unique is its almost uncanny ability to dry up a wet gas with the same efficiency as a blotter dries up wet ink. And, it does this continuously at high velocities with negligible re-

Passing a stainless wire mesh section through manway into a vacuum tower

NUMBER 2 OF A SERIES

How Gulf Periodic Consultation Service helps plants cut lubrication and maintenance costs

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They completely understand the effect of different operating conditions on lubricants and, just as important, the lubrication requirements of all types of plant equipment. And available to them are the facilities of one of the finest petroleum laboratories in the world.

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*Augusta, Maine	2463
Bakersfield, Cal.	2-4381
*‡Baltimore, Md.	Plaza 0300
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‡Butte, Mont.	2-2301
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Charleston, S. C.	9904
Charleston, W. Va.	37-565
*‡Charlotte, N. C.	5-3731
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*‡Chicago, Ill.	Whitehall 4-3860
*‡Cincinnati, Ohio	Garfield 2250
*‡Cleveland, Ohio	Cherry 1-7600
Columbus, Ohio	Main 4134
Corpus Christi, Texas	3-9237
‡Dallas, Texas	Randolph 4161
Davenport, Iowa	3-2761
Dayton, Ohio	Adams 9153
*‡Denver, Colo.	Keystone 8121
‡Des Moines, Iowa	2-0244
*‡Detroit, Mich.	Trinity 2-7010
‡Duluth, Minn.	Melrose 821
‡El Paso, Texas	2-5691
*Emeryville, Cal.	Olympic 2-3770
Erie, Pa.	24-867
Evansville, Ind.	5-7146
*Fairmont, W. Va.	501
Fergus Falls, Minn.	4250
Fort Wayne, Ind.	Anthony 3421
*Fort Worth, Texas	Fannin 6617
Fresno, Cal.	4-5097
Gary, Ind.	2-1468
‡Grand Rapids, Mich.	9-3106
Greensboro, N. C.	2-3415
Greenville, S. C.	3-7755
Hammond, Ind.	Russell 8937
Hartford, Conn.	5-0851
*‡Houston, Texas	Charter 4691
*‡Huntington, W. Va.	7146
*‡Indianapolis, Ind.	Market 3301
Jackson, Mich.	2-0519
Jackson, Miss.	5-1896
Jacksonville, Fla.	3-7431
Jamestown, N. Y.	3042
Johnson City, N. Y.	9-1561
*Johnstown, Pa.	81-257
‡Kansas City, Mo.	Harrison 7122
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*‡Milwaukee, Wisc.	Daly 8-1800
*‡Minneapolis, Minn.	Granville 3545
Mobile, Ala.	8-5443
Nashville, Tenn.	42-3505
*‡Newark, N. J.	Market 2-0200
New Haven, Conn.	5-3191
‡New Orleans, La.	Raymond 8656
‡New York, N. Y.	Whitehall 3-4321
Niagara Falls, N. Y.	9700
‡Norfolk, Va.	5-1639
Oklahoma City, Okla.	7-1633
Omaha, Nebr.	Harney 8700
Peoria, Ill.	7116
*‡Philadelphia, Pa.	Evergreen 2-1200
‡Phoenix, Ariz.	4-3158
*‡Pittsburgh, Pa.	Atlantic 1-8400
*‡Portland, Oregon	Atwater 9464
*Providence, R. I.	Gaspee 1-0818
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Reading, Pa.	2-0287
‡Richmond, Va.	2-4758
Roanoke, Va.	6263
Rochester, N. Y.	Monroe 1635
Rockford, Ill.	2-3452
Rutland, Vt.	3292
Sacramento, Cal.	Gilbert 3-6525
Saginaw, Mich.	4-2640
*‡St. Louis, Mo.	Central 1120
*‡Salt Lake City, Utah	5-3413
San Antonio, Texas	Garfield 5114
San Diego, Cal.	Franklin 8151
‡San Francisco, Cal.	Exbrook 2-5353
*‡Seattle, Wash.	Main 0808
Shreveport, La.	4-5298
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‡Spokane, Wash.	Main 3294
Springfield, Ill.	3-1532
*‡Springfield, Mass.	6-8373
*Sunnyvale, Cal.	5411
*‡Syracuse, N. Y.	2-1361
Tacoma, Wash.	Broadway 6565
Tampa, Fla.	2-7256
‡Toledo, Ohio	Garfield 4625
Trenton, N. J.	2-4136
Tulsa, Okla.	3-3191
*Utica, N. Y.	4-1194
Walla Walla, Wash.	5124
‡Washington, D. C.	National 8843
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Watertown, N. Y.	1400
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Wichita, Kansas	5-2631
*‡Wilkes-Barre, Pa.	3-1144
Williamsport, Pa.	4289
Worcester, Mass.	4-2648
York, Pa.	7851
‡Youngstown, Ohio	4-1118

For complete information, turn to page 22-23

* Apparatus Repair Plant ‡ Field Service Office § Renewal Parts Warehouse

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J-95156

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

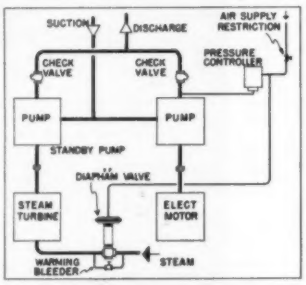
sistance to gas flow. In the process industries, this removal of a liquid in a gas stream is known as entrainment separation.

You'll find this stainless wire mesh hard at work in distillation equipment, liquid and gas separators, extractors, evaporators, dehydrators, scrubbers and gas absorbers. In such installations, separators are guaranteed by the fabricating company to give a performance of not less than 99 per cent efficiency or, expressed in another way, the gas that has passed through shall contain less than 1 gal of liquid per 1,000,000 cu ft of gas. *From Steel Horizons, published by Allegheny Ludlum Steel Corp., Pittsburgh, Pa.*

Control Makes Steam Maintain Flow When Electric Pump Fails

HERE'S AN IDEA that you might be able to use in your plant. It is an automatic standby cut-in in the event of the failure of an electrically driven pump.

An anonymous company has two pumps side by side, connected to



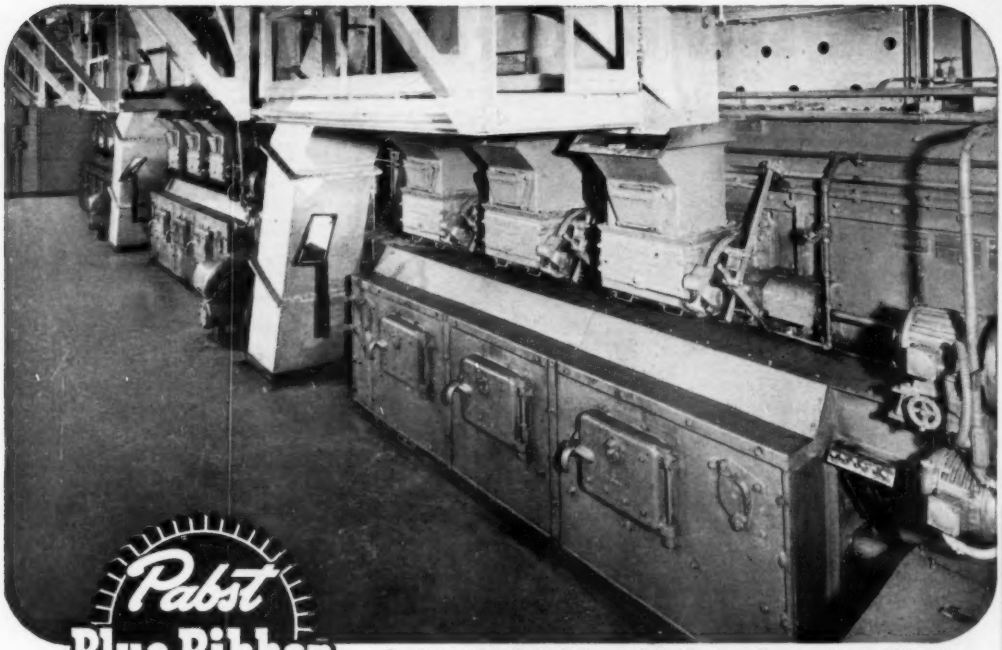
With this simple piping arrangement, steam turbine-driven pump can maintain flow in pipe upon electrical failure

common suction and discharge lines. The turbine-driven pump is a standby for the electric motor-driven one in case of power failure.

A pressure sensing tap is installed in the discharge line of the electric pump. This tap feeds into a pneumatic type pressure controller that positions a pneumatic diaphragm motor valve in the steam feed line to the turbine-driven standby pump. A warming bleeder by-pass is provided around this valve.

When power to the electric pump fails, the pressure ahead of the check valve falls quickly to suction pressure. As a result, the pressure con-

(Continued on page 40)



See Detroit RotoGrate Stokers in Pabst Brewing Company's new Milwaukee Boiler Plant. • Stone & Webster Engineering Corporation, Engineers.

Pabst Blue Ribbon

Trademark Reg. U.S. Pat. Off.

Pabst Blue Ribbon "HAS" DETROIT ROTOGRATE STOKERS

"What'll you have?" . . . "Pabst Blue Ribbon!" is a well known slogan. They "have" Detroit RotoGrate Stokers in their new Milwaukee plant, selected for their efficiency and dependability.

The RotoGrate is an advanced spreader stoker with forward moving grates that discharge the ash continuously at the front. The RotoGrate burns any type of Bituminous coal or Lignite and handles fluctuating loads without loss of pressure. All the steam you want when you want it, because of high burning rates that are possible. 4473

INVESTIGATE THE DETROIT ROTOGRATE STOKER

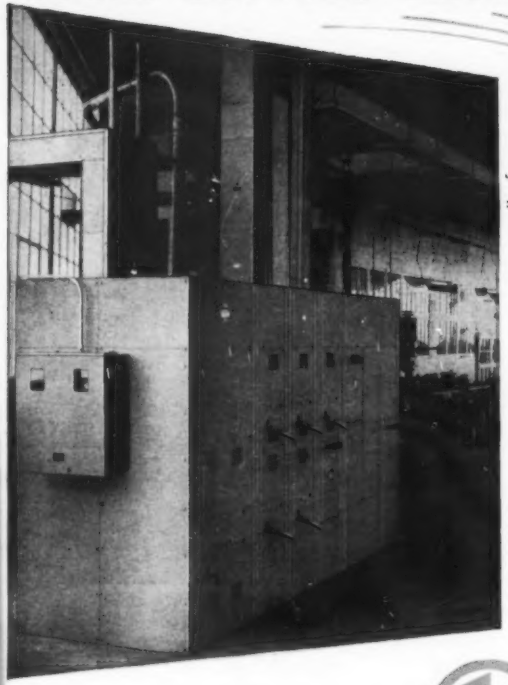
DETROIT STOKER COMPANY

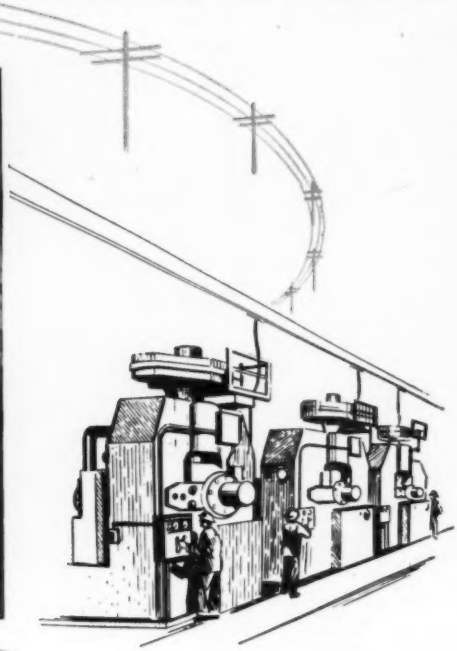
General Motors Building—Detroit 2, Michigan

District Offices in Principal Cities • Works at Monroe, Michigan

... on advertised products.

From Service Entrance to Machine



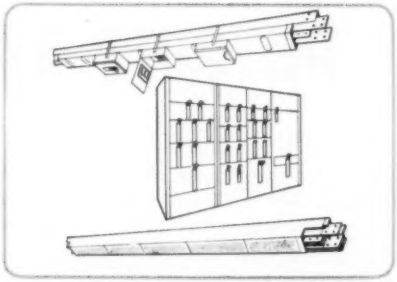


. . . it's FA all the Way!

AND FOR GOOD REASON. For more than 60 years FA has been producing quality products that are serving the needs of industry all along the production line — from service entrance to machine — electrical products that have been proven and time-tested to give maximum safety and performance.

If power and light distribution is a problem in your business . . . if you want products that are modern in design, rugged in construction, easy to install, economical to operate, and give long-lasting, trouble free service, then do as scores of others have done — install FA *all the way.*

For complete information about all FA products, contact your nearest FA representative, listed in Sweet's, or write to Headquarters.



A typical FA Installation is shown in the photo above (top left). Features include FA High Efficiency busduct to bring power into the plant from service entrance, a FA dead front Switchboard, and FA Power Plugin to carry power to machines.

Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

FA TRADE MARK

Our 61st Year

BULLETINS just released and of immediate plant interest

DUST CONTROL

101 Industrial Dust Control — Bulletin 909A, 28 pp, describes manufacturer's dust control equipment and its many applications. Case histories are documented with photos and performance data indicating savings achieved through these installations. Features the CH system of control utilizing cloth type filters for the collection of finely divided dry dusts and affording high recovery at economical cost. Elements of the system are described and pictured. Pangborn Corp.

102 Manual of Exhaust Hood Design —Bulletin 270-E1, 24 pp, features engineering data on dust control systems for the metal working industries. Illustrates and discusses the design of exhaust hoods for many operations in this field. Also, 61 photos of actual dust control installations show various methods of hooding dust sources. Includes tables of exhaust requirements, information on dust concentrations, weights of collected material. American Air Filter Co., Inc.

103 High Temp Filter Bags—How company's silicone-impregnated glass fabric is being used to provide economical baghouse dust collection at temperatures to 550 F is explained in Bulletin MC-2. Discusses low cost, heat and corrosion resistance of filter bags made of this fabric, also other advantages. Menardi & Co.

104 Cloth-Bag Dust Collector—Eight-pp Bulletin 914 introduces company's new cloth-bag dust collector for carbon black, cork, fine wood, graphite, pigments, soap, lime, metal oxides. Illustrated by photos and line drawings, tells how collector works, is installed and maintained. Gives specifications of standard collector sizes and dimensions. Tells how easily this collector can be inspected. Air circulation and details of mounting collector for various types of disposal are illustrated. Pangborn Corp.

VALVES, TRAPS AND PIPING ACCESSORIES

105 Corrosion-Resistant Valves — Bulletin V-217 is a 35-pp service catalog describing types, sizes, operation and features of company's Nordstrom corrosion resistant valves. Reference is also made to multiport, steam jacketed and power operated valves and their applications in the chemical and process industries. Typical analyses are given of ten commonly used alloys and tables included listing approximately 175 chemicals with their recommended alloy valves, lubricants. Rockwell Mfg. Co.

106 Valves of Iron—Bulletin V-405 gives, in concise form, the general specifications of company's standard iron gate, globe and check valves. Includes valves approved by Underwriters' Laboratories and others for fire line installations, also iron gate valves conforming to specifications of American Water Works Assn. The Fairbanks Co.

107 Industrial Steam Traps—Twelve-pp Bulletin 152 provides engineering and ordering information on steam traps equipped with bellows of bronze, Monel, or stainless, and bodies in bronze, semisteel and cast steel construction in ¼ to 2 in. sizes, for pressure from vacuum to 300 lb. Includes, beside capacity tables and dimensions, recommended piping diagrams, typical applications, tables and data covering the selection of traps for steam-using equipment. W. H. Nicholson & Co.

108 Air Line Cleaner—Eight-pp Catalog 252 describes manufacturer's Aridifier, a mechanical device for removing moisture, scale and other impurities from air or gas lines. Explains, illustrates operation, shows some typical applications and gives average cfm requirements. Tells how to select proper size unit, where and how to install it. Logan Engineering Co.

109 Self-Cleaning Strainers — Bulletin 252 describes pipeline strainers in ¼ to 3 in. sizes. A discussion of the value of sediment control points out various pieces of pipeline equipment needing strainer protection. The V. D. Anderson Co.

110 Welding Fittings—Catalog 1051, 16 pp, describes welding fittings for use with stainless steel light gage pipe, applicable to broad industrial use. Provides quick facts about the fittings, also analyses of stainless steels in which they are available. Fully illustrated, includes dimensional data. Tri-Clover Machine Co.

111 Dual Temperature Pipe Insulation—Data Sheet IN1.C3, 4 pp, describes pipe insulation designed to give maximum efficiency to pipe lines operating at low temperature or at alternate cycles of high and low temperatures, and to prevent condensation on pipes passing through warm, humid areas. Discusses thermal conductivity, vapor permeability, durability, other physical characteristics. Owens-Corning Fiberglas Corp.

HEATERS, HEATING

113 Improved Space Heaters — Six-pp Bulletin L-5391 on manufacturer's heat machines incorporates a description of their new air cooling feature. Shows how the improved heater can be converted in a few minutes from a 180,000 Btu portable heat machine which heats a 6-ft high work zone, to a 1500 cfm cool air circulator which provides air conditioning in summer. Fageol Heat Machine Co.

114 For All-Level Comfort — Eight-pp Bulletin 1251 describes company's Fin-Vector radiation stressing its space-saving, even-heating and low installation cost. Illustrates heating element utilized, covers designs available. Typical specifications and dimensional data are given, also basic capacities. C. A. Dunham Co.

115 Unit Heater Maintenance — "The Care and Maintenance of Steam and Hot Water Unit Heaters" is well illustrated and covers proper procedure in getting the most out of these heating units. Includes discussion of system corrosion. Industrial Unit Heater Association.

CONSTRUCTION AND MAINTENANCE

116 Concrete Slabs, How to Use Them—Just released, this manufacturer's 8-pp 1952 catalog on Prestressed concrete floor and roof slabs provides diagrams showing how these slabs are used with various types of construction. Includes a simplified load chart and an explanation of prestressing the slabs, permits heavier loads on longer clear spans. Also shows new ways to install heating systems, including hot water radiant and a warm air split system. The Flexicore Co., Inc.

117 For Glass Design Flexibility—Folder G2287 shows in detail the daylighting function of each of company's new PC 12-in. light-directing and light-diffusing functional glass blocks, and the 5 PC 8-in. functional glass blocks. As an aid in selection of patterns best suited to your application, gives recommended elevations. Pittsburgh Corning Corp.

118 Roof Protection — This folder describes Halcoloid, a specially processed weatherproof asphalt for waterproofing and preserving new and old roofs. Three formulations are presented, along with application suggestions and covering capacities. The Hallemite Mfg. Co.

119 Concrete Floors—"Traffic Concrete—A Study in Specialization" is a 20-pp, well-illustrated booklet explaining advantages of company's Dynapakt concrete floors in terms of materials used and especially developed methods of installation. A step-by-step comparison of these low-water methods, as opposed to other methods, is included. Flash-Stone Co., Inc.

120 Coatings for Special Jobs—This bulletin describing a dozen special coatings for plant maintenance, covers their use in solving such problems as skidproofing, rust prevention, painting over damp areas, weatherproofing and decoration of exterior masonry, interior waterproofing, painting over hot surfaces, protection against acids and fumes. United Laboratories, Inc.

121 Wood for Functional Construction—Eight-pp Form TSG6 describes glued laminated timbers from the standpoint of economy and versatility in industrial building construction. Discusses increased strength, dimensional stability, fire resistiveness, other advantages. Shows how their use permits adequate areas of clear floor space; describes glued laminated beam construction and glued laminated arches, bowstring and flat trusses. Fully illustrated. Timber Structures, Inc.

122 For Safer Footing—"Anti-Slip Floor Waxes" is a 12-pp brochure describing action of company's Ludox colloidal silica in imparting greater safety to floor waxes. Illustrated with diagrams and photos taken with an electron microscope, tells how tiny particles of Ludox surround softer wax particles to give skid resistance and hardness to wax formulations without impairing their gloss, freeze-resistance, water-resistance. Grasselli Chemicals Dept., E. I. du Pont de Nemours & Co., Inc.

123 Industrial Power Sweepers—Bulletin S-102 describes a gasoline-powered multi-purpose sweeper for indoor or outdoor use.

June, 1952

Card void after 6 months.

PLANT ENGINEERING

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Also, use this card for more information on advertised products.

Photos show performance features of sweeper, available in models for 36- and 48-in. sweeping swath. A cutaway illustration shows design, operation and dust control unit, brushes, other elements are pictured. Wilshire Power Sweeper Co.

ELECTRICAL

124 Induction Motors—Construction features of manufacturer's drip-proof and splash-proof squirrel-cage induction motors are described in illustrated Bulletin 51B7093. These include ratings in 40 C rise continuous rated open drip-proof and 50 C rise splash-proof construction, from 15 hp at 450 rpm to 800 hp at 3600 rpm. Allis-Chalmers Mfg. Co.

125 Textile Motors and Controls—Booklet B-5422, 32-pp, discusses problems common to the textile industry—lint clogging, shock and vibration, speed and tension control—and shows how they can be solved through correct use and selection of motors and controls. Eight case histories provide a sampling of the benefits to be gained. Westinghouse Electric Corp.

126 To Stop Overheating — This illustrated folder describes an "on-the-job" silver plating powder for use on high amperage connections. Tells how it reduces maintenance; gives directions for use. The Cool-Amp Co.

127 Variable Transformer—Bulletin P252 covers company's new Type 10 Powerstat variable transformer. Provides photos, outline dimensions, ratings and other descriptive material on the compact unit. Stresses efficiency, cool operation. The Superior Electric Co.

128 Flexible Cable—Bulletin BA-927 describes a flexible, protected tube cable intended to cut installation costs, save critical materials and offer other advantages. Discusses simplicity of cable, its safety, long lengths available. Includes tubing specifications. Bailey Meter Co.

129 Ground Fittings Selector Chart—This chart simplifies proper selection of ground fittings by showing how 30 common combinations of different ground wire and water pipe sizes can be made from only 10 stock parts. UL approved ground fittings for all sizes are illustrated. The Thomas & Betts Co., Inc.

The post card below needs no postage. Use it to order bulletins by listing item numbers of all those wanted. There's another card provided for you on page 171.

130 The Answers on Wiring—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths, as well as a partial list of users included. General Cable Corp.

Some Good Suggestions on Electrical Maintenance

131 Preventive Maintenance Tips — Booklet B-5477, 28 pp, gives a complete outline of preventive maintenance. Discusses programs designed to reduce shut-down time on production lines and treats in detail the maintenance of power equipment. A suggested schedule of work and cleaning on power equipment is presented in chart form. Essential information on preventive maintenance for turbines, generators, switchboards, motors and controls given. Westinghouse Electric Corp.

132 Battery Maintenance Chart — This 17 by 32 in. check chart is offered to improve maintenance of stationary batteries. Tabulates procedures to follow in basic maintenance operations and shows how often each should be done. Illustrated with five cartoons, it establishes rules to follow in charging batteries, adding water, keeping records, cleaning, locating, installing and connecting batteries. Instructions cover float and periodic charge methods. Gould-National Batteries, Inc.

133 Electrical Maintenance Service—Booklet B-4766, 24 pp, on company's maintenance service for electrical apparatus presents a program based on use of renewal parts, repair service plants and company's engineering and field service. Photos show skill, testing devices and repair equipment available to customers through strategically located repair plants. Improved design renewal parts are illustrated. Motor exchange service, inspection service and "on the spot" repairs described. Westinghouse Electric Corp.

134 Pyrometric Switches—Newly released Catalog 5800, 12 pp, illustrates and describes manufacturer's rotary, key and plug type pyrometric switches. Applications and pertinent circuits are also given. Dimensions, mounting details and switch circuits are included. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

135 Boric Acid Power Fuses — Booklet B-5469, 6 pp, describes a complete line of power fuses for compact and economical short circuit protection. Discusses company's B9 De-Ion boric acid fuse, DBA drop-out fuse, and BAL current-limiting fuse. Ratings, construction, operating characteristics and applications are presented. Westinghouse Electric Corp.

INSTRUMENTS, CONTROLS

137 Control Selection Guide — Eight-pp Bulletin GEA-5781 on electric and electronic controls, devices and accessories, contains quick-reference selection data, photos and listings of additional publications giving more complete information on each type of equipment. Covers manual, magnetic, combination and reversing motor starters, pushbutton stations; relays; limit switches; solenoids; relays; electronic timers; pressure and vacuum switches. General Electric Co.

138 Industrial Air Controls — Economy, performance and safety features of Robotair controls for holding, clamping, bending and staking applications are stressed in this 16-pp booklet. Fully illustrated, discusses in detail manufacturer's Robotair chambers, Rotochambers and control valves, illustrating design features and providing suggestions on where and how to use them. Also lists fittings, air gages for use with controls. Bendix-Westinghouse Automotive Air Brake Co.

139 Centralized Instrumentation—Conventional and graphic type panelboards, as well as the measuring and control instruments utilized are described and illustrated in color in 32-pp Bulletin 85-20. Not an ordering catalog, this book discusses some of the many possibilities of centralized instrumentation and illustrates some typical control systems. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

140 Bin-Level Control Switches—Bulletin 11-0 describes and illustrates company's complete line of Tellevel automatic bin-level control switches, introducing new heavy-duty and explosion-proof units. Typical installations are sketched and selection suggestions included. Stephens-Adamson Mfg. Co.

141 Bin Level Indication—Form BD-5 is company's 1952 catalog, 20 pp, covering bin level indicators for use where granular and pulverized materials are stored in tanks, hoppers and bins. Explains how level indicator works, gives dimensions, specifications on three models, along with suggestions as to mounting and use. Stresses advantages of indicators in preventing overflowing, clogging of conveyors, damage to machinery, etc. Also describes an aerator unit used to introduce low-pressure air into finely-ground materials to restore fluidity. The Bin-Dicator Co.

142 Temperature Controls — Twelve-pp Catalog G-17 covers manufacturer's full line of temperature controls, including four new instruments. Provides tables of application and performance for all instruments. Among the new models shown is an electric type with vapor tight cover for use in pneumatic systems. Also covered is the use of controls for temperatures from —300 to 1800 F. The Burling Instrument Co.

143 Miniature Indicators — Specification Sheet 770 describes the operation of a miniature indicating pneumatic receiver that provides manual loading and remote index setting. Illustrates the instrument, shows how it is used in a typical control system. Brown Instruments Div., Minneapolis-Honeywell Regulator Co.

144 Automatic Alternators—Bulletin 7100 covers company's automatic alternators. These not only transpose the starting sequence of any two pumps, burners, blowers or other units controlled by magnetic starters or two wire circuits, but have the additional feature of providing locked-in stand-by protection against failure of pilot device or alternator itself. Operation and construction of the unit are described. Automatic Control Co.

LIGHTING, COMMUNICATION

146 Outdoor Lighting Guide — Booklet B-5460 presents 84 pp of guidance on street lighting systems, including those for industrial roadways. Covers purposes of lighting, quantity required, design procedures, illumination computations and electrical distribution systems. Sample problems and solutions are given. Charts,

(Continued on page 160)

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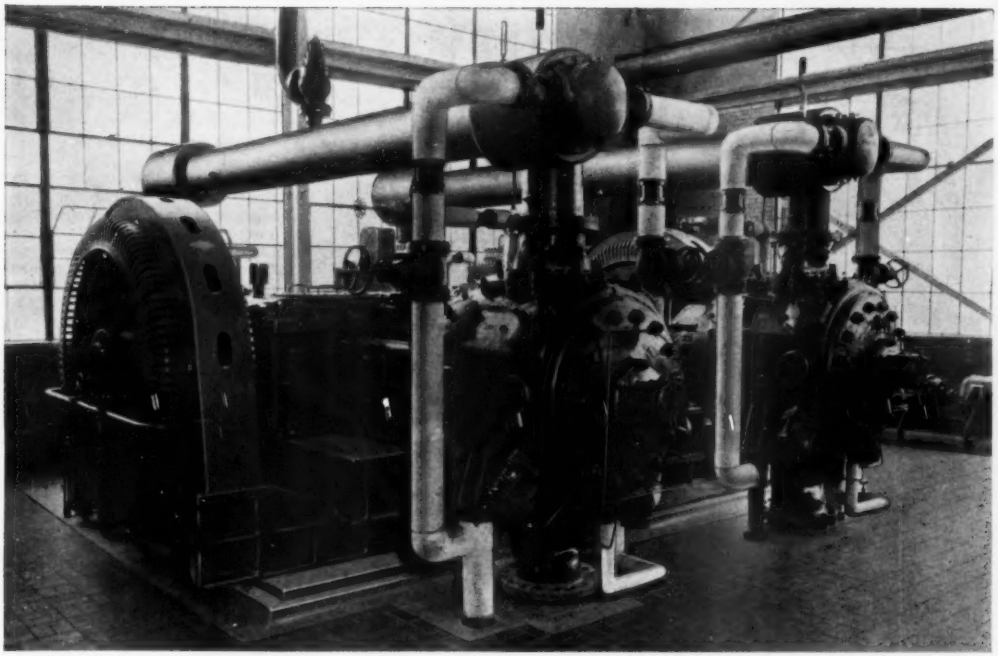

Two 600 bhp Clark CRA-2, Balanced/Opposed, synchronous motor-driven air compressors installed on steel framework on second floor of a Michigan auto body stamping plant.

vibration free...

these compressors can operate alongside even the most delicate of equipment

Perfect balance permitted a widely known Michigan auto body stamping plant to mount these two Clark Balanced/Opposed, Motor-Driven Air Compressors on the second floor, near production machines. Long pipe runs, with their attendant pressure drops, were thereby eliminated.

The fact that all vibration has been eliminated from the Clark Balanced/Opposed design permits installation anywhere. *There just isn't any vibration to be transmitted to nearby equipment!* This is especially important in plants having delicate machines and precision operations which cannot tolerate vibration.

Furthermore, with the unusual compactness of the Clark Balanced/Opposed design, it is feasible to install two units side-by-side (as illustrated), enabling greatest possible operating flexibility in meeting the varying air requirements of different plant shifts.

For information on the complete Clark Balanced/Opposed Compressor line, covering 150-4500 bhp, request Bulletin 118.

CLARK BROS. CO., INC. • OLEAN, N. Y.
One of the Dresser Industries
SALES OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD

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balanced/opposed
COMPRESSORS

For Quick Action Consult Bradley Men Nearest You . . .

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Birmingham 3, Ala., Thomas Supply
Boston 10, Mass., Mills Engineering
Buffalo 2, N. Y., M. S. Jackson
Charleston 28, W. Va., Fireproof Prod.
Charlotte 8, N. C., Wm. H. Shepard & Son
Chicago 10, Ill., Struck Equip. Co.
Chicago 11, Ill., West & Lasley
Cincinnati, Ohio, Loftus-Sheenberger
Cleveland 15, Ohio, Fielding-Wales Co.
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Evansville 8, Ind., Shouse-Brill Mach.
Fort Wayne 2, Ind., A. Frank Ausman
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New York 17, N. Y., A. C. Cooper
Oklahoma City 3, Okla., M. F. Fishell
Omaha 2, Nebr., B. G. Peterson
Philadelphia 8, Pa., Arthur Hicks, Jr.
Phoenix, Ariz., Baker-Thomas Co.
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Portland 4, Ore., Otto A. Cook
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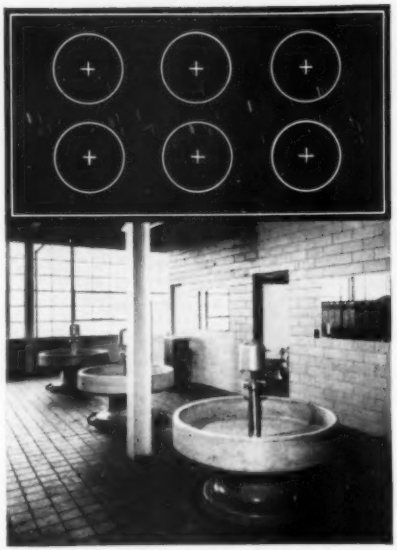
Washroom Engineers
Ready to Help Plan Sanitary *and* Economical Washing Facilities



8 to 10 persons wash simultaneously at a Bradley 54-inch Washfountain.

As important as any Safety measure in your plant are employee washing facilities ... Bradley men can help you in washroom layouts to provide maximum facilities in minimum space.

They can show you how plants large and small throughout the nation have standardized on Bradley Group Washfountains, and explain how piping connections are reduced over 70 per cent along with water consumption and maintenance.

If, before calling in a Bradley man, you want further information, write for a copy of our 4-color Catalog 4701. There is no obligation. BRADLEY WASHFOUNTAIN CO., 2371 W. Michigan Street, Milwaukee 1, Wisconsin.

Ask for Catalog 4701

BRADLEY washfountains — *Distributed Through Plumbing Wholesalers*

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

troller opens the diaphragm valve in the steam feed line. The turbine-driven pump immediately takes over the pumping job.

After electric power has been restored and the electric pump has has been started manually, the pressure controller automatically shuts down the turbine-driven pump as the pressure is restored at the discharge end of the electric pump.

Since the pressure controller is connected ahead of the check valve, it will not cut in during temporary pressure reduction because it can be set to cut in at only a little higher than suction pressure.

In addition, the pressure controller will not limit the pressure of the turbine-driven pump because it is connected on the motor-driven pump side of the line. *From Industrial Control News, published by Minneapolis-Honeywell Regulator Co., Industrial Div., Philadelphia, Pa.*

Stud Welding

NOVEL METHOD of fastening uses portable gun to end-weld studs. Semi-automatic arc welding technique has proved a valuable tool in construction, metal working, and maintenance work.

The tool which accomplishes the actual welding is a portable 5 lb gun that can be used in any position.

To support the ram mix and help transmit heat, studs are welded to open hearth furnace door. Fifteen large steel mills use this type of cost saving door

Power for the welding in operation is obtained from a d-c source, and a timer unit is employed to control accurately the amount and duration of the welding current.

Operation of the gun is quite simple. First, a stud is chucked into the gun and a protective ceramic ferrule is fitted over the welding end. This ferrule serves to concentrate the heat

"Irreplaceable You"

Protect hard-to-replace Metal Equipment with

INSUL-MASTIC

Protective Coatings

You can help the scrap drive by collecting scrap, but not by *creating* it. So keep acids, alkalis and moisture from making scrap of your metal vessels and equipment . . . Coat them with INSUL-MASTIC *superior* coatings.

INSUL-MASTIC is the original Gilsonite coating. The one which proved the great resistance of Gilsonite to chemical attack. INSUL-MASTIC's binder contains 50% of this nearly inert mineral. Other coatings contain about 5% . . . or just enough to mention.

This is only one of the marks of *superior* quality which has made INSUL-MASTIC the leader among coatings. The very high percentage of mica flake is another one. Mica flake helps to give INSUL-MASTIC *superior* coatings their exceptionally long life. And when you specify a coating, you want *long life.*

Another quality of INSUL-MASTIC is homogenization. This prevents the Gilsonite, mica and other ingredients from separating. When we spray INSUL-MASTIC you can be sure that no filler has settled to the bottom of the drum. We apply what you specify.

When writing your coating specifications remember it will pay you to give utmost protection to your vessels and equipment by choosing the leader among coatings. Specify INSUL-MASTIC by name.

Think first of the coatings that last!

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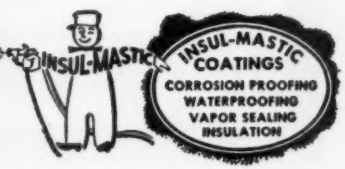


HOW MUCH ARE SLIPPING ACCIDENTS COSTING YOU?

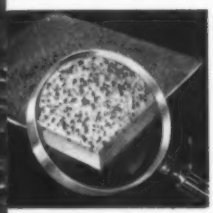
ACCIDENT REPORT
Cause of accident:
Man fell on a slippery floor.
Means of prevention:
Install A.W. ALGRIP Abrasive Rolled Steel Floor Plate.

There's an easy, economical way to end slipping accidents that steal man-hours and drag production down. Put positive non-slip protection in your plant with exclusive A.W. ALGRIP Abrasive Rolled Steel Floor Plate.

NON-SLIP—EVEN ON STEEP INCLINES!

ALGRIP is made by rolling tough abrasive grain (the same kind used in grinding wheels) *uniformly* as an integral part of the steel plate's upper portion. When you walk on ALGRIP, hundreds of tiny safety brakes grip your feet at every step. *Result:* It's virtually impossible to slip—even on steep inclines.

WEAR WON'T WEAR OUT ITS SAFETY!



ALGRIP's safety isn't merely a surface treatment. Note the even distribution *and* depth of the abrasive grain. As the surface wears, new particles are exposed, so ALGRIP keeps its non-slip qualities for a lifetime. It needs no maintenance. Rolled steel makes it stronger than other abrasive floorings. It withstands hard blows and heavy loads without cracking or breaking. And thinner sections can be used without reducing load carrying capacity.

Get Full Details of ALGRIP Today

Our new Booklet A-5 gives complete technical details, suggests uses. Write for your free copy. *It may save you countless hours and dollars!*

A.W. ALGRIP ABRASIVE ROLLED STEEL FLOOR PLATE

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Over 125 years of iron and steel making experience.

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

from the arc developed between the stud and the work, shields the arc, and restricts the flow of molten metal.

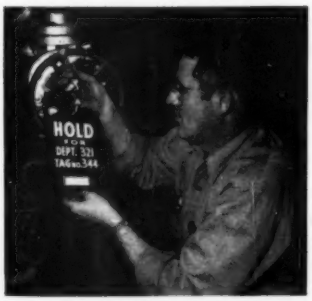
The stud is then pressed into position in the desired location, and the gun's push-button trigger switch activates a solenoid within the gun handle, which draws the stud about 1/16 in. from the work. An electric arc is formed between the work and the stud.

At the completion of the welding cycle, as determined by the setting of the timer unit, the solenoid is de-energized and the stud is plunged into the pool of molten metal created by the heat of the arc. Since a small portion of the stud is burned during the heating process, allowance is made in the stud design to give the proper after-weld length. After the stud is secured, a tap with a hammer breaks the ceramic ferrule off the stud.

End welded studs have proved their worth on machines and products ranging from small nameplates to huge power transformers. An important feature of stud welding is that studs can be welded at almost any stage in the manufacturing process. Production economies achieved by this method of fastening often result in cost savings ranging from 10 to 50 per cent, with occasional jobs showing even greater reductions. *From Welding Arcs, published by General Electric Co., Schenectady, N. Y.*

Tags Protect Lives

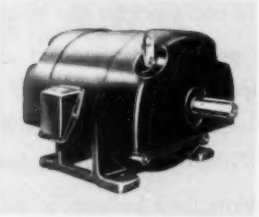
To PROTECT the lives of Allison workers, serially numbered tags are placed on all valves, electrical disconnecting devices or controls operated by the power house. These tags warn employees against opening



Employee is shown attaching tag to high-pressure steam valve. Small plate at lower portion of tag carries date and signature of person to be contacted

Horizontal C face mounting, frame with feet. As used on any close-coupled drive.

Type D flange mounting for vertical drive. Also available for horizontal application. Ideal for pump drives.



The splash-proof enclosure affords full protection against splashing liquids.

ELLIOTT Crocker-Wheeler

PROTECTED TYPE FORM BA MOTORS

● In addition to standard horizontal mounting, you can get this motor with Type C face mounting, horizontal or vertical. You can also get it in Type D flange mounting, horizontal or vertical, with or without feet.

The standard enclosure is open dripproof, with all openings below the centerline. Also available in splashproof enclosure, as illustrated below.

The basic motor has all the Crocker-Wheeler sturdiness of double-row-width bearings, prelubricated and sealed; Vinylastic-insulated coils, Alucast rotors and similar refinements. In NEMA frames 203 to 505 inclusive, and in ratings above. Write for the Form BA Bulletin.

ELLIOTT Company

CROCKER-WHEELER DIVISION
AMPERE, N. J.

For large motors: RIDGWAY DIV., RIDGWAY, PA.
Plants at: JEANNETTE, PA. • RIDGWAY, PA.
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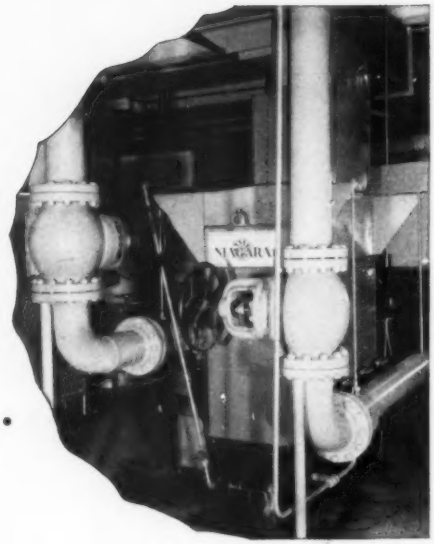
DISTRICT OFFICES IN PRINCIPAL CITIES
ELLIOTT APPROVED SERVICE SHOPS COVER THE COUNTRY

W2-1

How to get drier or cooler gases . . .



NIAGARA AERO AFTER COOLER cools a compressed gas, or air, below the temperature of the surrounding atmosphere, thus preventing the condensation of moisture in your lines. The gas will contain only half of the moisture left in it by conventional methods. Even drier gas can be produced if you require it.

In working with controlled atmospheres of inert gases to prevent undesired reactions, this dryness of the gas at low cost is a great advantage. The cost of the Niagara method is low because it uses evaporative cooling, saving 95% of the cost of cooling water (and its piping and pumping). This direct saving of cost pays for the Niagara cooler in less than two years.

If you use compressed air to operate tools or pneumatic equipment you save much in water and oil damage to tools and equipment, and in water damage to materials by using the Niagara Aero After Cooler.

Write for a bulletin, or ask nearest Niagara Field Engineer if you have a problem involving the industrial use of air.

NIAGARA BLOWER COMPANY

Over 35 Years' Service in Industrial Air Engineering

Dept. PE, 405 Lexington Ave. **New York 17, N. Y.**

Experienced Field Engineers in Principal Cities of U. S. and Canada

PLANT ENGINEERS' DIGEST

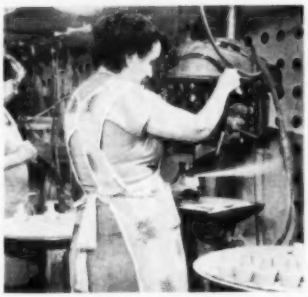
(Digest begins on page 28)

valves or closing electrical circuits while unusual conditions prevail.

Tags are registered at the power house office and any questions concerning the reason for their use in a particular location are to be directed there.

In the interest of safety all hold tag regulations must be observed by all employees and enforced by all supervisors. "Nothing can be taken for granted." The action concerning the use of a hold tag may mean the difference between life and death. *From AllisoNews, published by Allison Div., General Motors Corp., Indianapolis, Ind.*

Porcelain Dust Ventilation



By use of air suction through baffle vents in rear of machines, operators in counter-boring, slotting and cleaning insulators are protected from inhaling porcelain dust, shown in operation at right. From a General Electric News Picture Supplement, a publication of the General Electric Co., Schenectady

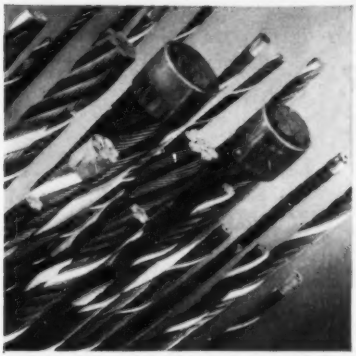
Bell Signals Pump Stoppage

ALL INFLAMMABLE liquids used in the Pontiac Motor Div. plant of Pontiac, Mich., are stored at a tank farm and pumped from there to various locations throughout the plant. These include ethyl and standard gasoline, Duco thinner, mineral spirits, kerosene, anti-freeze and naphtha.

The job of the caretaker is to see that the various pumps keep operating and to empty the contents of the railroad tank cars into the storage tanks. The men who are on this job have trained themselves so that they can detect the instant a pump stops operating. When this happens they cut in a second motor-driven pump instantly, which takes over the pumping job.

Should a pump go out of action while the caretaker is outside his pump house emptying a tank car, it

MACWHYTE



PREformed . . . Internally Lubricated

WIRE ROPE

for all equipment

From Macwhyte's complete line of a thousand and one sizes and types you get rope best suited to your equipment, designed, PREformed, and internally lubricated to provide long, safe service. (Catalog G-15.)

Wire Rope

SLINGS

for lifting and moving materials and equipment in production or maintenance.

There are hundreds of types and sizes of Macwhyte Flat-Braided, Round-Braided, Single-Part, and Grommet Slings. All are custom made in length, capacity, and flexibility to meet your needs. (Catalog S-8.)

Wire Rope

ASSEMBLIES

for machine parts, controls, and operating devices.

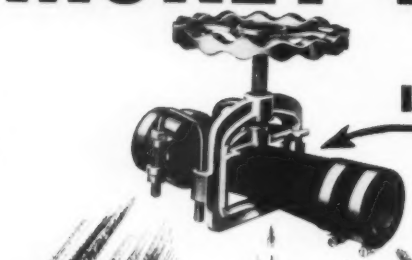
Macwhyte Safe-Lock wire rope assemblies are made to order in length, strength, and flexibility desired. Terminals are permanently attached to one or both ends. There are many standard types. (Catalog 5201.)

Macwhyte Company, 2991 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

Catalogs are available on request to Macwhyte Company or authorized distributor. 1016 SW

YOUR MONEY BACK

IF IT PLUGS



Basically, the Flex-Valve is just a piece of flexible tubing and a clamp to squeeze it shut. It can no more clog than a length of pipe. So, if you can clog one of them in normal service, just tell us, for the "incredible-but-true" record, how in the world you did it, and we'll send your money back.

Flex-Valves have solved thousands of valving headaches —in as many plants as there have been installations made. They can handle anything that flows, including aerated or fluidized solids. They close bubble-tight over 1/8" solids. Open, the flow is straight-in-line with the service piping, and completely unobstructed. There are no moving parts in contact with the lading fluid. Available in both natural and synthetic materials for every corrosive or abrasive service.

Complete details on this unique principle of control valving in slip-on, flanged, and air-motor operated types are available on request. Ask for **Bulletin 500***—without obligation, of course.*

Farris FLEXIBLE VALVE CORP.

316 COMMERCIAL AVE. • PALISADES PARK, N. J.

11-52

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

This battery of switches is isolated from the plant and is used to control some of the units that pump flammable liquids from tank farm to plant

is only a matter of minutes before the breakdown is reported to him by telephone from the plant. An alarm located on the outside of the pump house summons him to the telephone. *From Pontiac Warrior, published by Pontiac Motor Div., General Motors Corporation, Pontiac, Michigan.*

Sacrificial Pipe Protection

HUNDREDS of miles of steel main and distribution pipe have been buried in the ground in and around Phoenix, Ariz., to serve customers with natural gas. When this pipe is placed in the ground, it has a definite limited life span due to corrosion. This process of corrosion re-

Man on left holds wire which leads to magnesium anode. Free end is ready to be attached to an underground gas line

duces the steel to an oxide and results in pits and holes in the pipe —thus a leak is born.

The leaks that result mean lost gas and when they become too numerous it means that the pipe must be replaced. Pipe replacement is an expensive proposition, so Arizona Public Service Co., has insti-

"The easiest Operating FORK TRUCK there is!"

This NEW LEWIS-SHEPARD SPACEMASTER® Electric Fork Truck has a Magnetic Personality . . .

THEY'VE TAILORED THE COUNTERWEIGHT TO THE LOAD . . . PUT IT WAY BACK, DOWN LOW WHERE IT COUNTS.

I GET MORE STABILITY, MANEUVERABILITY, AND A LIGHTER WEIGHT TRUCK, ALL AT THE SAME TIME.

FAST LIFT? IT GIVES ME MORE LIFTING SPEED THAN ANY ELECTRIC TRUCK I'VE SEEN.

ANOTHER THING . . . YOU NEVER HAVE TO GET UNDER THIS TRUCK. EVERY PART IS EASY TO GET AT . THERE ARE ABSOLUTELY NO UNDER TRUCK ADJUSTMENTS.

MAGNETIC CONTROLS PRACTICALLY RUN THE TRUCK FOR ME. I GET SPEED, DIRECTION AND BRAKING ALL WITH ONE LEVER. INCHING OPERATIONS EVEN WITH FRAGILE LOADS ARE A CINCH.

I SIMPLY THROW THE CONTROL HANDLE TO FULL SPEED FORWARD OR REVERSE AND GET A SMOOTH, TIMED ACCELERATION. THE MAGNETIC CONTROL WITH FOUR SPEEDS FORWARD AND REVERSE GIVES ME AND MY LOAD A MUCH SMOOTHER, SAFER RIDE.

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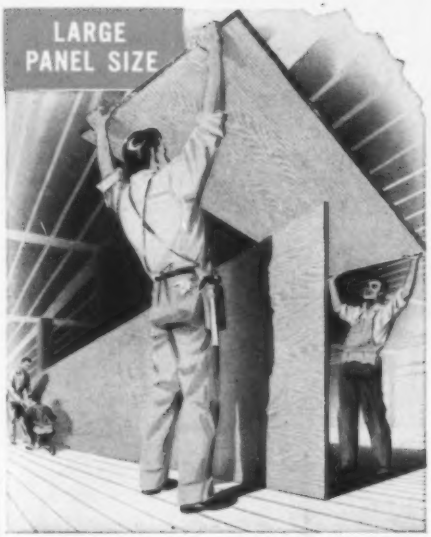
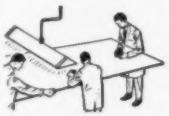


1 Large Panel Size

2 Cross Laminated Strength

3 Attractive Appearance

4 Workability


5 Tested Quality

6 Light Weight

HERE's a material that lets you reckon building progress in *square yards* instead of cramped inches. Plywood's work-speeding size means jobs which once took days are now being done in hours.

Most plywood comes in big 4x8-foot sheets, and there are many other standard sizes both smaller and larger . . . even panels up to 50-feet long. Plywood is light, strong and amazingly tough. No wonder more and more alert designers, engineers and builders are every day turning to this modern material to update building and manufacturing methods. *How about you?*

For technical assistance on special problems write Douglas Fir Plywood Association, Dept. 476, Tacoma 2, Wash.

Douglas fir plywood is real wood, made by "unwinding" giant logs

into thin wood sheets which are inseparably cross-laminated

to form large, light panels having beauty and great strength

Douglas Fir Plywood

AMERICA'S BUSIEST BUILDING AND INDUSTRIAL MATERIAL

PLANT ENGINEERS' DIGEST

(Digest begins on page 28)

gated a limited program called cathodic protection to stop this reversion of steel to the oxide form in selected areas.

Corrosion is an electro-chemical process. It has been determined that corrosion takes place at the point where electric current leaves the pipe. Where the resistance of the soil is low enough that it makes a good conductor, there is a continuous flow of current with corrosion taking place at the high potential point.

The method being used to decrease this source of corrosion is to install self-sacrificing magnesium anodes set in a low resistance backfill. This anode impresses approximately a 1½ v potential on the steel pipe. Thus current flows through the soil onto the pipe and is drained off through a wire brazed on the pipe and leading to the anode. When the potential drops approximately 0.3 v, the pipe is said to be under protection. *From Spark and Flame, published by Arizona Public Service Co., Phoenix.*

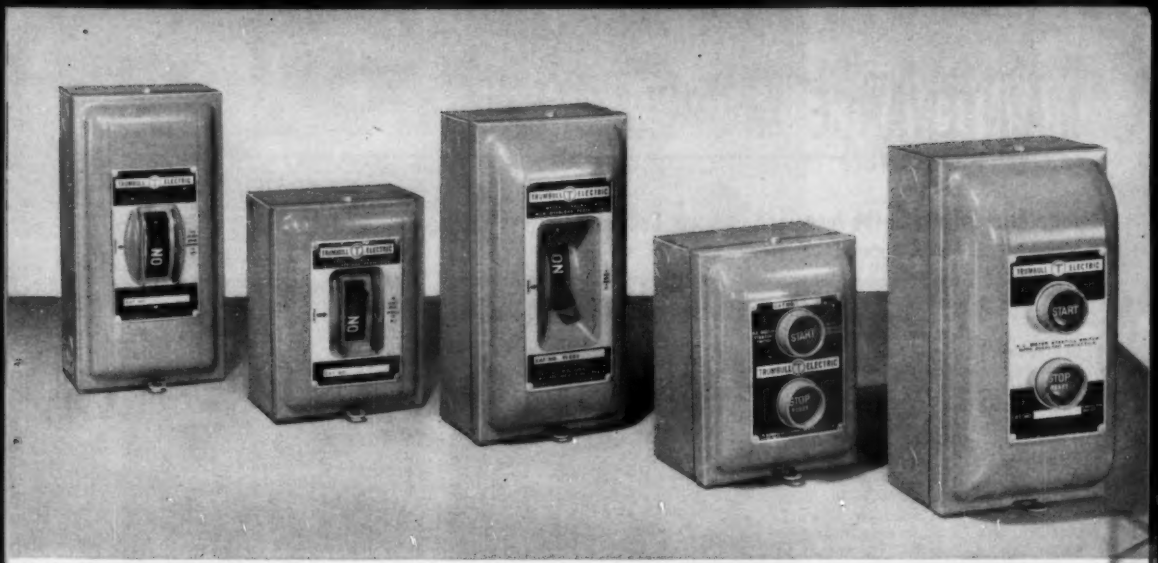
Waxing Helps Rectifiers

SIX MECHANICAL rectifiers were installed by the North Carolina Pulp Co. for high voltage precipitators which recover chemicals out of the recovery boiler stacks. These 75,000 v units are installed in a separate room which is kept as clean as possible, but due to the amount of air required to cool the outfit, outside air is drawn into the room through filters.

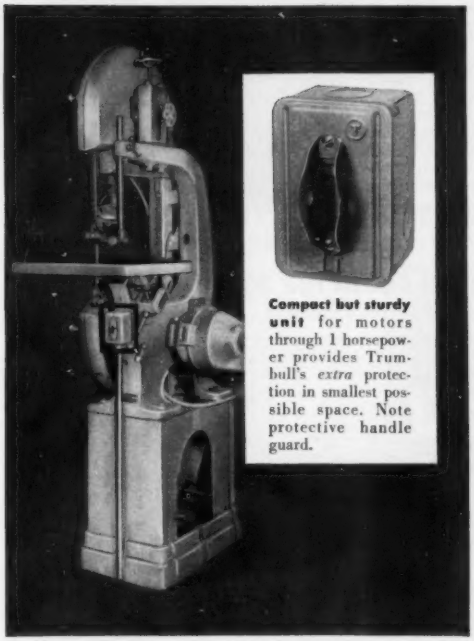
Despite precautions taken to eliminate dust and dirt it still collected on the insulated arms of the synchronous rotating member of the rectifier, and with the slightest evidence of moisture, "Flash-over" occurred. To overcome the difficulty, the insulated parts were wiped daily but this considerably increased maintenance costs.

In attempting to find ways and means of eliminating this daily cleaning the insulated arms were cleaned with a wax cleaner, after which they were given a coat of polishing wax. As a result the units ran for a full week, 24 hr per day. After this length of time they were shut down and given another cleaning and waxing.

This method of preventing "Flash-overs" worked so well that the same treatment was given to all such insulated arms in the distribution system. *From Maintenance News, published by Westinghouse Electric Corp., Pittsburgh, Pa.*



Trumbull Manual Motor Starters are designed to control and protect motors up to 7½ horsepower. Note the clean attractive appearance of this representative group of pushbutton and toggle types. Third from left is special loom switch for textile applications.



Compact but sturdy unit for motors through 1 horsepower provides Trumbull's *extra* protection in smallest possible space. Note protective handle guard.

Typical installation of a Trumbull Manual Starter in a machine shop. Unit is positioned for maximum operating convenience.

When you buy motor protection be sure you get this extra protection

You wouldn't buy manual starters that didn't provide some motor protection. But why buy mere *overload* protection when you can just as easily get this *extra* protection in *Trumbull Manual Starters* whether you prefer pushbutton or toggle type:

- **EXTRA PROTECTION against accidental starting**—No chance of an accidental bump starting or stopping the motor because every toggle or pushbutton is *guarded*.
- **EXTRA PROTECTION against misreading**—Exceptionally clear, unmistakable ON and OFF markings.
- **EXTRA PROTECTION against tampering**—Doors can be locked and handles (on toggle types) can be locked. Unauthorized personnel cannot tamper with starter or operate (toggle) motors.
- **EXTRA PROTECTION against fault-locating delays**—Clear trip indication facilitates immediate location of faults.
- **EXTRA PROTECTION against outside conditions**—An enclosure for every application: general-purpose, water-tight and dust-tight, hazardous-location, as well as a special loom switch for textile plants.
- **EXTRA PROTECTION against temperature changes**—The heater, vital overload watchman, is fully enclosed in a special thermal cavity.
- **EXTRA PROTECTION against installation mistakes**—Heater is so designed that it *can't* be installed incorrectly.

By sticking to Trumbull Manual Starters—whether requirements call for a compact fractional horsepower unit or one of the trim-looking pushbutton or toggle units for motors up to 7½ horsepower, the user is assured of *fast action* on overload or stalled-rotor conditions with Trumbull's improved overload device, *positive, quick-action tripping* without kick-outs from vibration, and *easy* resetting with contacts that *can't* be closed against overload.

Write today for circulars TEC 7 and 317A on Trumbull Manual Starters.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

MAINTENANCE & OPERATION of buildings, utilities and facilities

Edited by H. E. B. Anderson

Third Prize Winner in the June PLANgineering Contest Describes Folding Scaffold for Painters

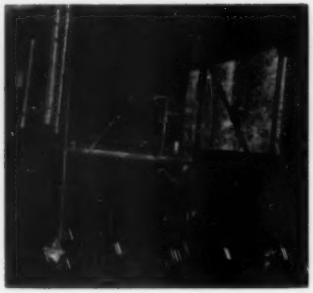
Submitted by Myron Bixler, Plant Engineer, Dungan, Hood & Co.

TO EXPEDITE the application of two coats of paint to the ceiling of a plant office, to minimize moving of desks, chairs and office machines, and to maneuver easily in and out of the cubicles into which the office was divided, a painter's scaffold had to be of a special design.

The scaffold that met all these requirements was made of pipe, welded into the standard scaffold shape, but modified to suit the limiting conditions under which it was to be used. It was designed to present a work platform six ft square, with time-saving paint pot holders mounted atop each corner post. Braces were welded at a height above that of the desks in the office; this feature permitted ready movement of the equipment around the office.

The maneuverability through the doorways was accomplished by building hinged construction into the scaffold; hinged joints at each corner, the work platform hinged and divided at the center, and easy removal of the brace which linked two diagonally opposite corners.

By removing the paint pot holders, swinging the hinged halves of the work platform over the sides, and lifting off the diagonal brace, the scaffold can be made narrow enough to pass through the office cubicle doors. Bumpers, cut from rubber hose, were wrapped around the framework to protect desks and doorways, and loops welded to the paint pot standards provided points for securing a guard rope around the work platform.



1. Scaffold in open position. Working platform halves are swung up to use

2. Detail shows access ladder, rubber bumpers, and pin for diagonal brace

3. Scaffold in closed position fits through standard office door to enter cubicle

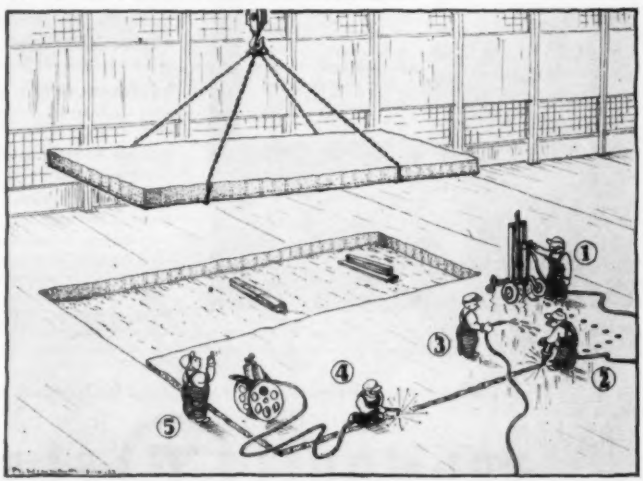
Fourth Prize Winner in the June PLANgineering Contest Outlines Concrete Floor Removal Method

Submitted by R. W. Hiller, Plant Engineer, Engineering Works Division, Dravo Corporation

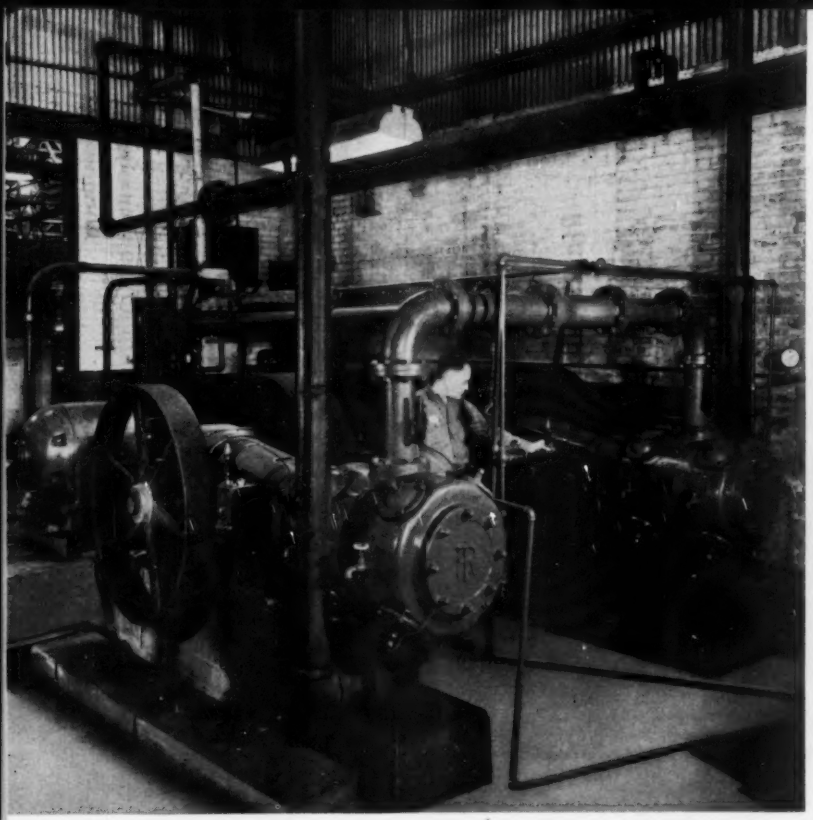
THE INITIAL PROBLEM of a boring mill installation was the removal of a large section of concrete floor.

To speed the removal, and minimize the dust effect on the machining being done in the area, a system of slab removal was used. This greatly simplified procedure was carried out by the removal of three 6 ft by 18 ft slabs of 8 in. concrete.

The system is illustrated on the sketch as follows: 1. A wagon type pneumatic drill pierced the floor slab boundary on 12 in. centers, following a chalked outline. 2. A pneumatic pavement breaker followed the drill and broke out the concrete between the holes, exposing the steel reinforcing mesh. 3. A stream of water kept both drill and breaker wet, to keep the dust out of the air. 4. A burning torch followed the breaker and cut the steel reinforcing. 5. After the section was free, one end was raised to place wood blocks under the slab, permitting insertion of slings for final removal of the slabs by the overhead crane.



Sketch submitted with contest entry is reproduced to illustrate various phases of the system used in cutting and removing the concrete floor in slab sections



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Compressors give carbon the air

• When carbon formed on the valves of these air compressors and the oil in the crankcases had to be changed frequently, operators of this Midwest plant called in a Standard Oil lubrication specialist. He recommended STANOIL Industrial Oil, a multi-purpose oil having a low carbon-forming tendency and containing effective oxidation and corrosion inhibitors. With STANOIL, the compressors gave the air to carbon troubles and have breezed through four years of hard operation without difficulty. Over the oil previously used, STANOIL has given four times longer service in the crankcases. These results . . . similar to the results you may expect . . . have led to the use of STANOIL in other equipment in this plant.

STANOIL
TRADE MARK
Industrial Oil

Find how this multi-purpose oil can benefit you by discussing it with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office.

Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY (STANDARD) *(Indiana)*

MAINTENANCE & OPERATION

(M & O begins on page 50)

Steel Balls Smooth Out Curves

RE-SIZING of small diameter tubing bends, flattened as a result of the bending, has been simplified at Temco Aircraft Corp., Dallas, Texas. Equipment which had been used to remove dents in straight tubing sections was applied to the re-sizing process to restore close diameter tolerances required in the tubing.

A series of egg-shaped steel balls, with lengths of aircraft control cable attached to the small ends, is drawn through the bent tubing by a hydraulic cable testing machine. From two to four balls are used, with the size of the balls gradually increased to the size required for the final inside diameter of the tubing. Used with a hard oil lubricant, the balls do no damage to the tubing sections. With both steel and aluminum tubing, the operation makes possible tolerances to 0.001 in.

Operator prepares to draw steel ball through tubing to restore diameter

Looking for Leaks In a Dry Pipe Sprinkler System

Contributed by H. N. Josleyn

TRACKING DOWN A LEAK that is just large enough to set off the sprinkler system low pressure alarm intermittently is a tedious job, even under ideal conditions. But in adverse cases, where the temperature is too low to permit the use of the standard soap solution, or where the leak is so minute that it shows no drips when the system is put under water pressure, these usual methods are to no avail, and leaks are almost impossible to locate.

To offset the freezing effects of the weather, a soap and anti-freeze solution was developed. It was found that a solution of 50 per cent soap and 50 per cent Prestone made a base from which to mix cold-weather soap testing solutions. With 15 per cent by volume of water added to the basic solution, the resulting mixture can be used to make the soap test at temperatures as low as —25 deg F., brushing it on the pipe to check for leak-indicating bubbles.

To locate the most minute leaks, the presence of a highly odorous liquid in the pipe will generally prove of great value. The use of a pint of oil of wintergreen, poured into a sprinkler system and backed up with a maximum of air pressure, has been successful in locating leaks in such hard-to-find places as inside pressure gauge casings. In one instance, the odor test disclosed a leak in a spot not usually tested—the body of a 6 in. cast iron tee.

Re-Use Cooling Water, Cut Costs

Contributed by R. P. McKee, General Motors Corporation

IN THE INSTALLATION OR re-arrangement of resistance welding equipment, the disposal of the water used to cool the contactor tubes and electrodes often presents a cost problem. This is particularly true when it is necessary to break concrete floors and install sewers.

The need for quantities of rinse water in our plating operation supplied an effective solution to the cooling water problem. Re-use of this water in plating rinse tanks re-

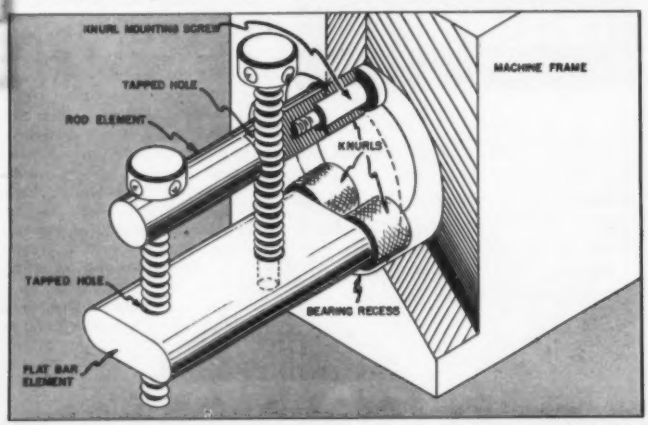
Inside Knurling of Bearing Housings Insures Tight Fit For Replacement Bearings

Contributed by F. E. Riley

CONSTANT REPLACEMENT of bearings in machinery often results in the bearing housings becoming oversize. Insertion and removal of hardened ball and roller races have a peening effect on the housing bore, enlarging it and reducing the degree of bearing rigidity.

It is a popular practice to increase the diameter of a shaft by knurling it, thus raising a series of high spots on the shaft surface. The same principle can be applied internally to accomplish the reduction of the effective diameter of holes such as bearing housings.

A tool suitable for internal knurling consists of a holder with three knurling wheels. The wheels can be made from ¾ in. diameter drill rod, and hardened. The small bores of standard knurls preclude their use in this particular tool design, which requires a large bore and a recessed shoulder on the knurls to accommodate the holding screw heads.



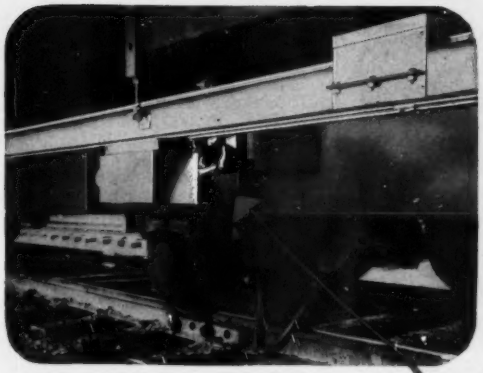
Construction detail of knurling tool shows screws for tightening tool in housing

One knurling wheel is mounted on the end of a length of 5/8 in. diameter cold rolled steel rod, and the other two are mounted on the end of a piece of flat stock, rounded for smoothness.

The operation of the knurling tool holder approximates in reverse that of a toolmaker's clamp, with the rod element and the flat element joined by two screws. One screw is a sliding fit in the rod and the other engages a tapped hole. The lower end of the screw engaging the tapped hole in the rod is a running fit in a hole in the flat bar, and a shoulder on this screw forms the thrust surface for forcing the elements apart. The knurling wheels are pressed into the bore of the machine housing, and the whole tool is rotated. The knurls thus travel completely around the walls of the bearing housing, forming a uniform pattern around the bore, and decreasing its effective diameter, for a snug bearing fit.

From

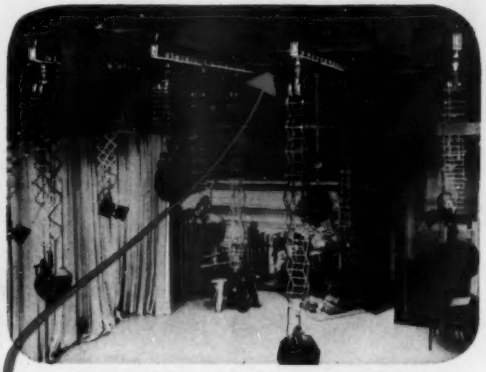
FREIGHT CAR ICING



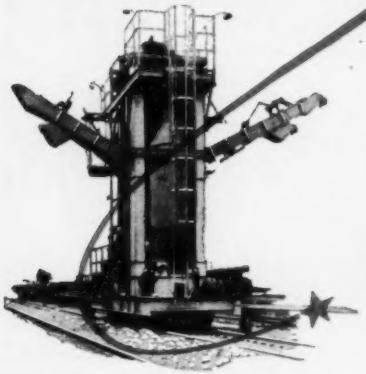
Above, track and trolley supplying current to one of two icing machines, shown below, developed by Railways Ice Co., and built by Link Belt Co., for Denver & Rio Grande Western R.R.

To

TELECASTING



Feedrail powers and positions vertically heavy TV lights by a flick of a switch.



ELECTRIC FEEDRAIL®

Mobile Power Outlets Move Jobs on Schedule

A freight car iced in fifty seconds! Only a ten second interval between cars! That's how trainloads of perishable freight are now iced and speeded to market on schedule. When this modern icer is on the move, power is supplied by Feedrail for twelve motors totaling 179 HP plus 7½ KW for communications, lighting and coded control. In telecasting, split-second timing to keep on schedule is essential. Feedrail mobility speeds the rearranging of studio lighting and provides a dependable, unfaltering source of power.

Industry is always on the move. Product changes demand flexible electrical power distribution. Moving Feedrail trolley outlets enclosed in overhead tracks roll quickly to where power is needed. When major changes are required — dismantle, rearrange and remount, reusing original units. Add or remove machines, without delay, to speed change-overs and work in process. Unit costs will decrease in direct ratio to the increased production facilities which Feedrail versatility affords. Write for literature.

Sold by leading electrical distributors.

46-B

ELECTRIC FEEDRAIL®

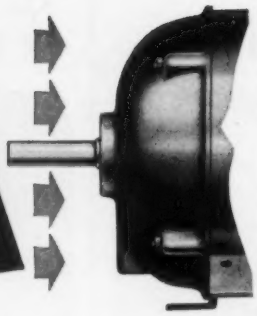
Never Becomes Obsolete

FEEDRAIL CORPORATION

Subsidiary of Russell & Stoll Company, Inc.

125 BARCLAY STREET · NEW YORK 7, N. Y.

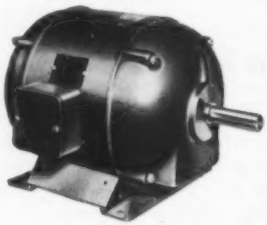
HERE'S *Full-Height* MOTOR PROTECTION



Shrouded End-Heads give R&M Motors a Head Start on Lower Maintenance

OPENINGS ARE SCREENED

Openings are screened in standard All-Weather Motors to exclude rodents attracted by warmth, and prevent the entry of air-borne debris which might obstruct air passages. R & M high-velocity end-to-end "Clean-Sweep" ventilation has no converging currents to deposit clogging dirt.



Types include drip-proof, splash-proof, explosion-proof, totally enclosed fan-cooled, and vertical motors with drip-proof or splash-proof housings. Sizes range from 1 to 7½ h.p. for single-phase and d.c., from 1 to 125 h.p. for polyphase. Drip-proof motor shown.

The extra protection of R & M end-heads is a "*plus*" all users appreciate, for—like R & M Weatherizing—it guards internal motor parts from harm and serious damage. You can see for yourself how this full-height enclosure sheds falling liquids and objects—why open-type motors, *even outdoors*, require no other cover.

"ALL-WEATHER" MEANS "USE ANYWHERE"

This *special kind* of standard motor is the finest we've ever built—the finest you've ever used. It's ideal for any environment . . . where it's dry, dusty, humid, damp; in mild acid or alkaline fumes. And R & M Quality in bearings, windings, insulation—in *every* construction detail—is carefully preserved for longer life by exclusive design or shielding.

PROTECTED INSIDE AND OUT

Nowhere else can you get the performance protection of R & M All-Weather Motors. FIRST, shrouded end-heads. SECOND, rotor and shaft are rust-inhibited. THIRD, stator and shell have a baked-on coating of moisture-resisting "Robbinite." FOURTH, cast-iron end-heads and terminal box receive anti-corrosion treatments. FIFTH, terminal box is gasketed. SIXTH, lead-ins are sealed. SEVENTH, end-head openings are screened. EIGHTH, repellent grease keeps moisture away from the extra-wide, sealed ball bearings.

AN EASY WAY TO CUT MAINTENANCE

Don't be satisfied with *less* than R & M All-Weather excellence. These cool-running, long-lasting motors sell at the *standard motor* price. And when you buy new powered equipment, specify "Robbins & Myers." Write for the All-Weather Story, Bulletin P-400-E.

R&M means Reliable Motors

ROBBINS & MYERS • INC.

SPRINGFIELD 99, OHIO • BRANTFORD, ONTARIO

MOTORS • HOISTS • CRANES • FANS • MOYNO PUMPS

MAINTENANCE & OPERATION

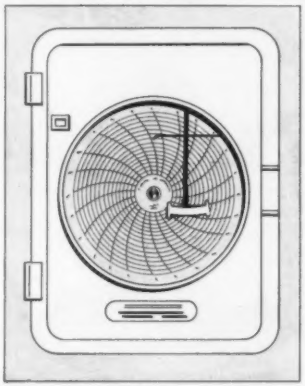
(M & O begins on page 50)

sults in a substantial saving in water costs.

In the installation of the welding equipment, the cooling water is brought to the welder through overhead pipe lines to the cooling circuit inlet on the welder. After the water has completed its cooling circuit through the welder, rather than flowing into a floor sewer, it is piped back to the rinse tanks on the plating equipment, to be re-used as rinse water.

In addition to the savings in water costs, the cost of installing an overhead pipe line is considerably cheaper than breaking concrete and installing a cast iron sewer, with each welder installation.

Flow Meter Range Marks



Lines painted on the face of flow meter doors permit quick checking of pen position in relation to operating limits

Choose the Correct Cutting Oil

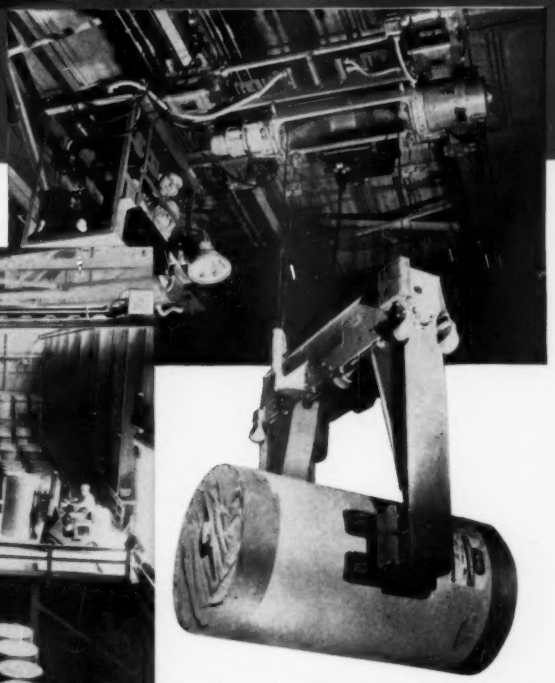
IN ORDER to keep high production tools cool and clean cutting despite stepped-up feeds and deep cuts, the coolant must be carefully selected. Only the best oil will reduce frictional heat as heavy chips are being taken out of the workpiece. The following factors should be considered in selecting the coolant for a job: Nature of the tool material; capacity of the machine used; finishes and tolerances required, and feeds and speeds employed.

When machining aluminum, soluble oil emulsions of kerosene and lard oil mixtures will assist in chip removal and in prevention of overheating. For aluminum turning jobs, lard or mineral oils are best. For plain carbon or high speed steel reamers, pure lard oils, a mixture

CLEVELAND TRAMRAIL

THE OVERHEAD TRACK TO
Lower Production Costs

This warehouse has a capacity of 4100 tons. Rolls are piled vertically up to 33' 0" high.



This powerful grab transports rolls without damage and turns them to any position. Most rolls at Oklahoma are 40" dia. x 5' 5" long and weigh 1500 lbs. Other Cleveland Tramrail grabs handle rolls to 6000 lbs., 12" to 60" dia., to 86" long.

Roll Handling IN NATION'S MOST MECHANIZED NEWSPAPER PLANT

TREMENDOUS cost-cutting advantages have been secured with a roll-handling Cleveland Tramrail crane installation in the warehouse of the Oklahoma Publishing Co., publishers of the *Oklahoman* and *Times*, leading Oklahoma City newspapers, listed as follows:

1. Virtually all warehouse damage to paper has been eliminated. This formerly amounted to as much as 5 tons a month.
2. Conserves space because areas formerly used for aisleways are now used for storage.
3. Vertical piling permits storing far more rolls, because space formerly lost with out-moded method of pyramiding rolls horizontally is utilized.
4. Vertical storage means that paper stocks can be dated upon arrival at warehouse and used in order received.
5. Back-breaking labor formerly required for handling rolls is eliminated.

The Tramrail cranes pick the rolls up whether in horizontal or vertical position and stack them on end, the entire job being controlled from the crane cab. 4000 tons are handled monthly—2000 tons into storage and 2000 tons out.

Whether you have rolls of paper or steel to handle, glass, lumber, cloth or machinery, Cleveland Tramrail can help you. Most likely you can obtain exciting advantages with a well-planned installation.

GET THIS BOOK—Write for a free copy of Book 2008. Packed with valuable information, this well-illustrated book starts you thinking of ways you can step up production and lower costs in your plant

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO
7595 EAST 284th ST. WICKLIFFE, OHIO

CLEVELAND TRAMRAIL

THE OVERHEAD TRACK TO *Lower Production Costs*

Four motor-driven push-button-controlled gantries work under the heavy overhead crane in the Heavy Duty Turret Lathe Assembly of Warner & Swasey Co. The vast amount of hand fitting and scraping calls for a great deal of localized lifting and handling. The gantries provide this service and eliminate "down" time waiting for the overhead crane.

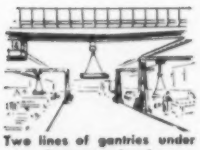
Single Leg Gantries . . . *Little Cranes That Give Production a Big Boost!*

PRODUCTION and methods engineers in many plants charged with finding ways of boosting production have *rediscovered* gantry cranes. They have put them to work in greater numbers, and by so doing have stepped up output in varying amounts, often by exciting percentages.

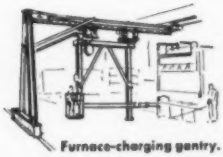
Where large overhead traveling cranes are used, single-leg gantries have been found particularly valuable. They serve as helping hands to the large cranes. The usual procedure is to provide a number of gantries, one for each local area, and a large overhead crane for an entire shop bay. The gantries take care of the light local or spot handling and the heavy overhead cranes do the heavy lifting, traveling from one end of the bay to the other.

Because single-leg gantries are relatively inexpensive, several can usually be purchased for less than the price of an additional large overhead crane. Thus through their use far better handling can be provided at a lower initial investment.

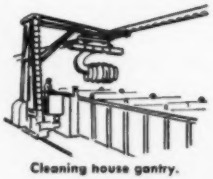
CLEVELAND TRAMRAIL GANTRY CRANES are Built for Either Manual or Electric Operation.



Two lines of gantries under heavy overhead crane.



Furnace-charging gantry.



Cleaning house gantry.

Hand-propelled gantry.

GET THIS BOOK—Write for a free copy of Book 2008. Packed with valuable information, this well-illustrated book starts you thinking of ways you can step up production and lower costs in your plant

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
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Some of the Services You Obtain From

HALL System of Boiler Water Conditioning

1. Hall Laboratories studies completely all factors affecting water used to produce steam in your plant.

2. The Hall Engineer responsible for service to your plant sets up procedures for conditioning all waters involved in the generation of steam and power to avoid unscheduled outages.

3. Designated employees are instructed how to make essential control tests and samples are checked by Hall Laboratories.

4. Hall Service Engineers cooperate with your plant personnel to detect difficulties and thus prevent water problems before they occur.

5. Hall Engineers act as "trouble shooters" should water problems arise.

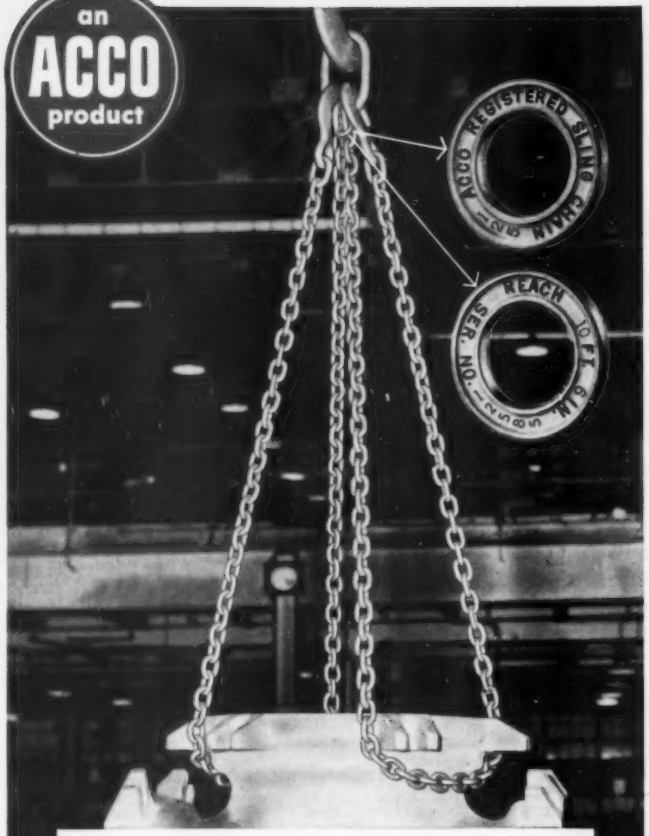
6. The analytical, identification and research facilities of Hall Laboratories are at your disposal for the solution of your problems.

Whether your boiler plant is small or large, low or high pressure, problems of corrosion, foaming, and scale formation must be avoided by the maintenance of suitable water conditions. Hall Engineers have a huge backlog of experience and information on which to draw to help you avoid boiler water problems.

Hall Laboratories' pioneering work in the field of boiler water conditioning has naturally led to the study of other industrial water problems. Now every phase of the use and disposal of water in industry is included in the scope of Hall service. For more information, contact Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pennsylvania.

HALL LABORATORIES, INC.

an ACCO product



ACCO Registered Sling Chains are Versatile

● Here an ACCO *Registered* Sling Chain is used in a double basket hitch. It could also be used as a two-legged bridle, or as a double choker. The tough 125 Endweldur ACCALLOY Chain is much lighter in weight and is easy to handle. It has great service life. The permanent identification ring on every ACCO *Registered* Sling Chain is your sign of safety and guarantee of quality.

See your AMERICAN CHAIN distributor. He'll show you how easy and economical it is to choose and use the best sling chains made.

ACCO

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TRADE MARK

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Bridgeport, Conn.

MAINTENANCE & OPERATION

(M & O begins on page 50)

of paraffin oil, or a petroleum and turpentine mixture is preferred by most shops. For carbide tipped reamers, soap solutions will help conserve the tool. For tools cutting copper and brass workpieces, light mineral oil with or without small additions of lard oils is generally used.

Choice of a cutting oil for machining stainless steels depends on the force required to displace the material in drilling, blanking, punching, turning and other shop operations. These oils should be chosen from lists especially prepared after a study of these operations by a group of stainless steel producers and cutting oil manufacturers.

Painting Wire Fence with a Roller

A NEW DEVELOPMENT in economical methods for painting wire fence has been proposed by the Rust-Oleum Corp., Evanston, Ill. Using a special, long-nap, lambs-wool roller, a completed fence job shows that approximately 99 per cent of the paint used goes on the fence, rather than on the painters and the ground. The roller also coats at least 70 per cent of the other side of the fence, due to the rolling action, and the joint coverage is excellent. Splashing, dripping and spray are eliminated and time requirements are about one-half those for ordinary brush or spray.

For a long fence, a four man team is suggested by Rust-Oleum. The first man works three to six feet in front, applying paint liberally, coating only the wire sections and barbed wire. The second and third men follow by several minutes,

Workman applies paint with a roller

working on each side of the fence with a "dry" roller, to catch the surplus paint, usually hanging in many places along the fence. The fourth man applies the paint to the pipe framework, using a brush. Average paint usages are quoted at about one gallon of paint per 5 sections (5 ft high and 10 ft long).

When painting, the workman dips the roller into the paint container. As he pulls it up, he rolls it on a flat board to remove any running surplus paint. The roller is then applied to the area to be painted.

Forkless Fork Truck For Stacking Without Skids

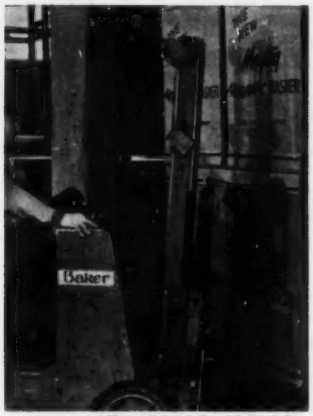

Photo: Baker Industrial Truck Div.

Metal lip (arrow) attached to fork truck back plate hooks under carton top flaps to lift cartons without skids

Blinking Lights Signal OK on Conveyor

Contributed by K. K. Kagarise

IN A SLAG PLANT, the discharge from a gyratory crusher flowed onto a 42 in. belt, on pulley centers over 100 ft apart. Whenever slippage occurred at the head pulley, the belt slowed down, permitting an abnormally heavy load to build up on the belt. This additional load would, in turn, stop the belt entirely. Material being fed into the crusher (from a point where the conveyor belt could not be seen) would back up through the crusher and out onto the floor before the belt stoppage was noticed.

To signal the belt stops to the men feeding the crusher conveyor, a lamp system was devised. A collector ring, taken from a squirrel cage motor, was mounted on the end of a return roller under the belt. The collector ring had approximately ⅛ of its circumference cut out, with a length of fiber inserted in the space. Carbon brushes, mounted about 180 deg apart, were connected into one side of a 110v light circuit which

Spare the Back, and ... Speed the Load!

● This WRIGHT *Speedway* Hoist saves effort and speeds material handling. It's the modern way to move things in your shop. And the WRIGHT *Speedway* is the completely modern hoist for hook, lug, or trolley suspension.

In the *Speedway* you get alloy steel gears, self-lubricating ball and roller bearings, preformed improved plow steel cable, grooved drum, rigid metal weatherproof wire conduits, silver contact controls, and other important features. The WRIGHT *Speedway* is designed for long life and requires minimum maintenance. Capacities from ¼ to 10 tons.

See your distributor today or write us for literature.

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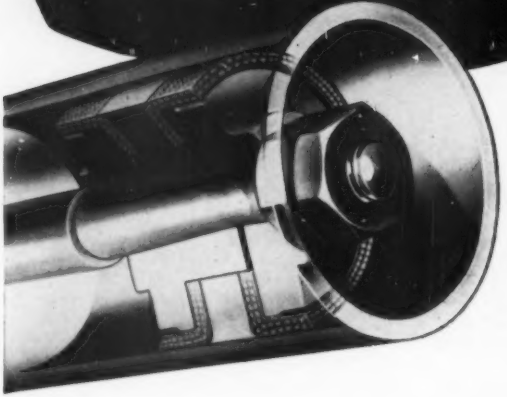
higher efficiency
WITH DARCOVA PUMCUPS
ON THE JOB!



THERE are two basic, well-proved reasons why more and more Darcova Pumcups are going into cylinders of air and hydraulic controls and mechanisms.

First, texture-engineered Pumcups outlast most other piston packings at least 3 to 1. There's less replacement, less down-time!

Secondly, efficiency *does not diminish* as Pumcups wear. Response is always faster, surer, with less power consumed!

Darcova Pumcups are available in sizes and engineered textures ideal for virtually any service. Why not find out what they can save *you?*

ASK FOR BULLETIN No. 4502

DARLING VALVE & MANUFACTURING CO.

Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

MAINTENANCE & OPERATION

(M & O begins on page 50)

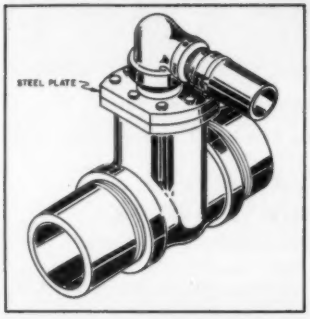
supplied current to lamps installed near the crusher feeding area.

As the return roller rotated, the fiber insert broke the circuit intermittently, and the lights blinked on and off as long as the conveyor belt was moving. If the blinking interval increased, the operators knew that the belt was slowing down, and stopped feeding the crusher conveyor until the belt was able to pick up speed again. If the belt stopped completely, this was signalled to the feeding area by the light remaining steadily on or off, depending upon the position of the brushes in respect to the fiber insert.

The signal system has completely eliminated the previously often-necessary job of cleaning off the overloaded belt, and digging the material out of the crusher.

Valve Bonnet Removed to Provide Temporary Connection to Pipe Line

FOR TEMPORARY access to a pipe line, for flushing, unblocking or pressurizing the line, a connection



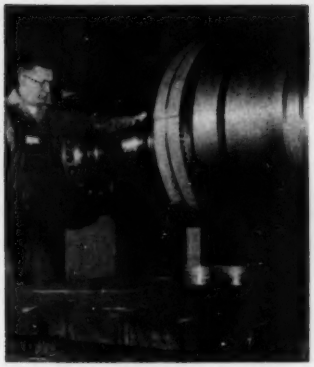
Rubber hose connection completes access fitting attached to valve after bonnet is removed and steel plate installed

may be made up to be attached to a valve in the line. A steel plate, cut and drilled to match the valve body, replaces the bonnet. A pipe nipple, threaded in or welded on the plate, becomes the starting point for any suitable piping or hose connection, such as the elbow, nipple and hose shown in the sketch.

V-Block Positions Heavyweights

Contributed by Raymond Dabroski, Allis-Chalmers Manufacturing Company

A ROTATING V-block, equipped with bearings, is used to transfer turbine spindles from cars to cranes. Its fabrication was suggested to elimi-



V-block, positioned on transfer car, supports one end of spindle as overhead crane turns it into position for pickup of free end by second crane

nate the hazards involved in moving the heavy spindles from one machine bay to another.

The main bay crane could place the spindle with one end on each of two cross-track cars for transfer, but two smaller side bay cranes were needed to lift it from the cars to the lathes for machining.

This free-turning block permits the 90 deg rotation of the spindles for crane pickup on both ends without the dangerous wedging and blocking previously necessary to position the spindle under the two cranes used to lift it.

Carriage Mounting Improves Lathe Light

AN APPLICATION developed in a machine shop of the Standard Oil Co. of Ohio makes unusual use of a cable reel. The reel action permits the mounting of a light directly on the lathe carriage, so that the light source travels with the cutting tool, and remains on the work. The presence of the light in the same relative position in regard to the work relieves the tendency for operator eye strain, and frees both of the operator's hands for improved operation of the lathe.

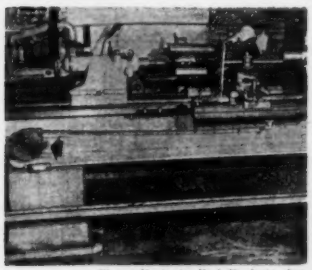


Photo: Benjamin Reel Products, Inc.

Cable reel mounted on lathe permits installation of light on moving lathe carriage, increasing safety and accuracy

DUSTUBE

recovers 4 tons of phosphate dust per day **for**

MONSANTO CHEMICAL COMPANY

In the phosphorous processing plant of Monsanto Chemical Company, dust arising from the handling of sintered phosphate ores, Florida phosphate rock and coke is effectively controlled with a Dustube Collector.

Recovering 4 tons of dust per day which is returned to the sintering operation, the Dustube noted for its many cost saving features plus its high collecting efficiency, cleaned up extremely dusty material handling operations.

As in plants that set the pace in every industry, the Dustube engineered to your specific requirements can solve your dust and fume problems. Canadian Representative: ROBERT A. CAMPBELL, 106 Adelaide St. W., Toronto, Ont.

Here's why it pays to own a DUSTUBE

HIGHER EFFICIENCY • POWER SAVINGS
BETTER DUST REMOVAL • EASE OF INSPECTION
LESS FILTER WEAR • FASTER FILTER REPLACEMENT

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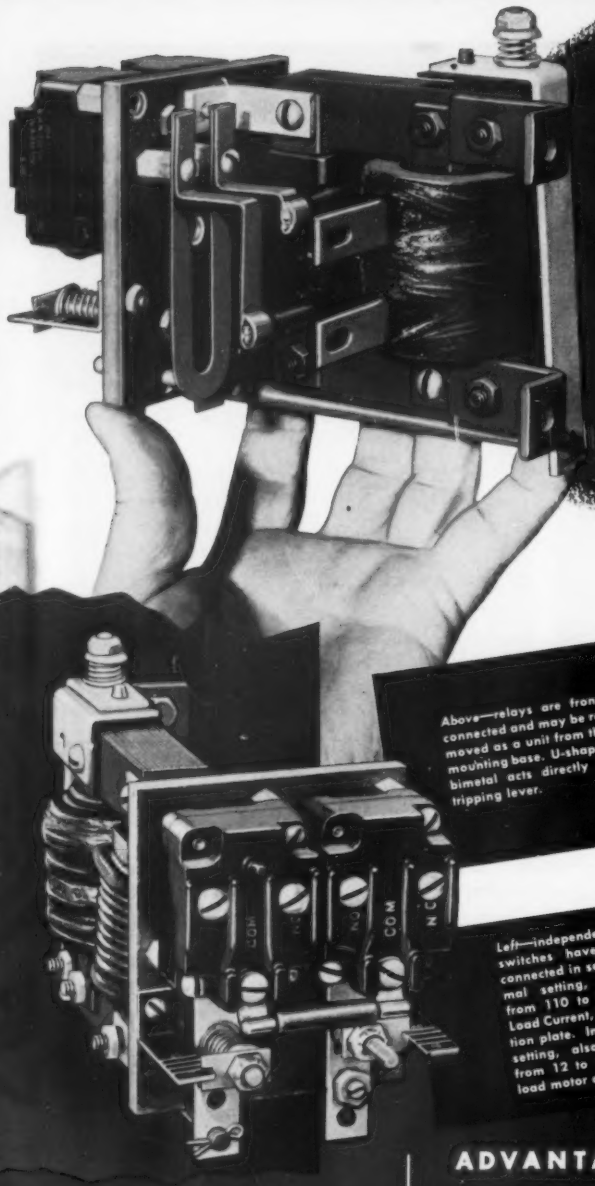
New EC&M..



Above—relays are front-connected and may be removed as a unit from the mounting base. U-shaped bimetal acts directly on tripping lever.

Left—independent micro-switches have contacts connected in series. Thermal setting, adjustable from 110 to 125% Full Load Current, has calibration plate. Instantaneous setting, also adjustable from 12 to 25 times full load motor current.

1 Instantaneous Trip (magnetically)

2 Timed Responsive Trip (thermally) on Single Phase, Failure to Start, during Running, etc.— *all* in this *one* relay

ADVANTAGES

THERMAL-MAGNETIC *Overload Relays*

Completely Protect A-c Motors under all conditions

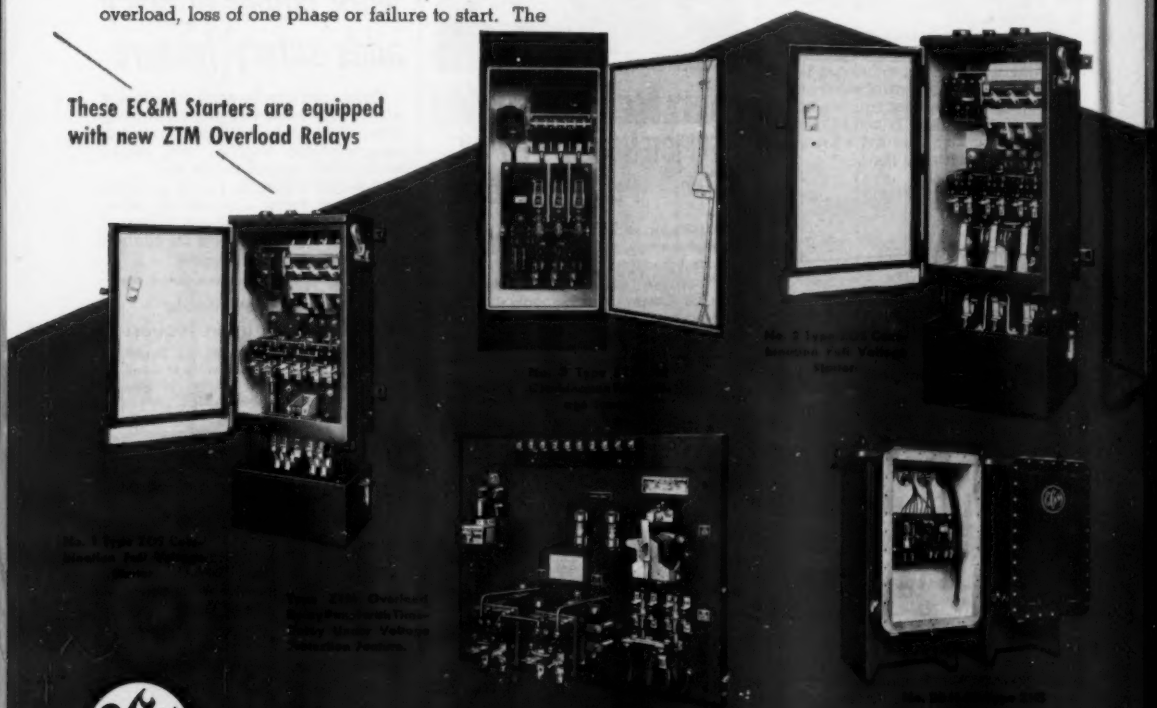
DIRECT-ACTING . . . NO DASHPOTS

Thermal-Magnetic tripping characteristics — an ideal combination of proved advantages—to give complete protection to the a-c motor under *all* conditions. On squirrel-cage, synchronous and wound-rotor motor starters and controllers, these relays provide positive, *timed-response* to the thermal energy of load currents.

They protect the motor from overheating due to overload, loss of one phase or failure to start. The life of motor insulation is increased by keeping temperature rise within safe limits. Useless tripping on harmless temporary overloads is eliminated.

On higher values of current resulting from short circuits, damage is minimized by instantaneous trip, causing the starter to open and disconnect the motor from the line.

These EC&M Starters are equipped with new ZTM Overload Relays



THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79TH STREET • CLEVELAND 4, OHIO

Panel discussions on how casters help reduce the **"Reducible 30%"***

MATERIALS-HANDLING FORUM

Write us how you've used casters to solve specific handling problems. $25.00 will be paid for material used.

A SERIES PUBLISHED BY BASSICK, WORLD'S LARGEST MANUFACTURER OF CASTERS AND FLOOR PROTECTION EQUIPMENT

EQUIPMENT MADE MOBILE OR HELD RIGID AT TOUCH OF POSITION LOCK LEVER

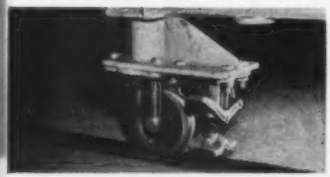
Now a machine or piece of equipment can be either portable or held securely in a fixed position at the flick of a lever.

This is achieved by installing Bassick Position Locks with Bassick Casters. The lock is easy to apply, with a downward press of the foot lever . . . easy to release, with a slight upward pressure under the lever.

Equipped with grooved base for use on angle iron track

Equipment moving on Bassick Grooved-Wheel Casters and angle iron track reaps the extra advantage of being held securely in place when special Bassick Position Locks are installed, equipped with a base grooved to fit the track.

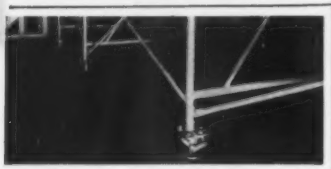
The grooved-wheel-angle-track assembly method is being used by many of the nation's leading industries (aircraft, auto, etc.) to control movement by keeping all handling equipment in line in fixed position. It makes movement 3-to-1 easier than flat wheels in direct contact with the floor.



PORTABLE CONVEYOR EFFICIENCY UPPED BY POSITION LOCKS

A greater and more efficient utilization of conveyors is possible with casters and position locks.

Conveyor sections mounted on Bassick Casters can be moved where desired and held securely and safely by Bassick Position Locks while in use.



Boxing ring on casters and position locks easily moved or held rigid

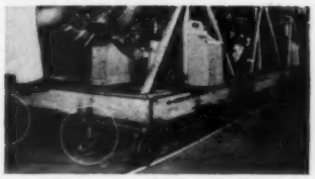
A unique installation of casters and position locks on alternate legs makes possible easy handling of this boxing ring in an armory.

Bassick Position Locks give adequate stability under rough usage. The ring can be moved quickly and easily by two or three men.

Moving assembly line made stationary when necessary

Many industries require an assembly line that can be held rigid during certain steps of manufacture.

This is accomplished by installing Bassick Position Locks on caster-equipped trucks. Universal joint action compensates for unevenness of floor surfaces.



Securing portable work ladder in place adds safety feature

Safety can now be economically and efficiently added to the flexibility afforded by caster-equipped work ladders, scaffolds, benches, tool stands, work stands, engine stands, etc.

Bassick Position Locks provide this safety factor . . . placing, when applied, almost 12 square inches of friction locking surface in contact with the floor.

Full details available upon request

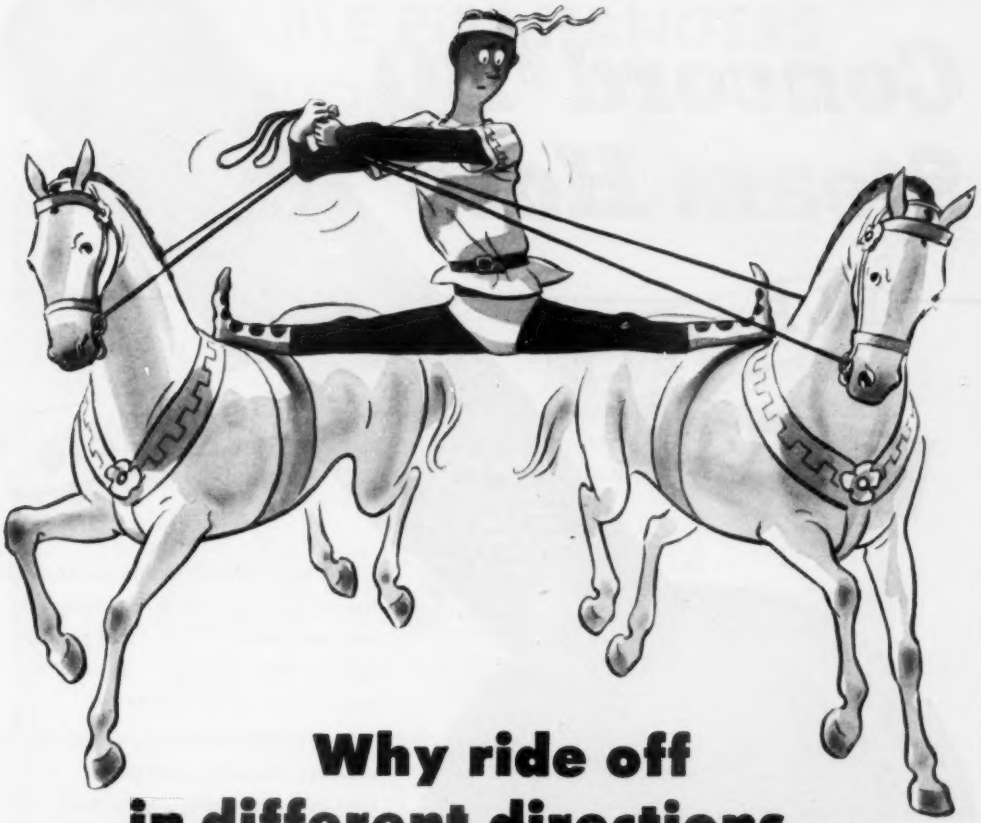
Write for catalog data on Bassick Position Locks. There is a local distributor of industrial supplies in your vicinity who handles Bassick casters, wheels and locks for every need. Factory engineering assistance readily available.

THE BASSICK COMPANY, Bridgeport 2, Conn. *In Canada:* Belleville, Ontario.

*According to cost analysts, materials-handling (about 30% of total cost) affords about the only real opportunities for cost reduction today.

Bassick — A DIVISION OF STEWART SW WARNER

MAKING MORE KINDS OF CASTERS . . . MAKING CASTERS DO MORE



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Concord #20 Steam Hose

FLEXIBLE

Tough

Dependable

Illustration shows how special built-in lining of stainless steel inner wire braid assures long life under the most severe operating conditions.
Pat. applied for

BWH Concord #20 Steam Hose has a protective built-in lining of stainless steel wire braid that guards against tube swelling . . . assures dependable, long-lived service.

This rugged, braided inner lining assures maximum steam flow . . . permits easy recoupling in the field.

Other Concord #20 construction features: two or three braids of alternate high tensile steel wire and rubber layers firmly bonded over outside of tube. These provide maximum burst-protection and safety. An asbestos braid provides positive cover adhesion and acts as cover insulator. A durable, abrasion-resistant cover withstands severest abuse.

Put Concord #20 Steam Hose to work for *you — now!*

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BWH
DEPENDABLE RUGGEDNESS

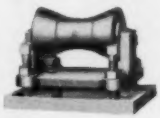
ADJUSTABLE PIPE HANGERS AND SUPPORTS

for every piping requirement

NO. 3 OF A SERIES SHOWING THE GRINNELL LINE

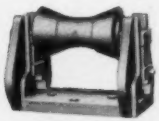
pipe rolls

Pipe Roll and Plate
Fig. 277
2 to 30 in. pipe

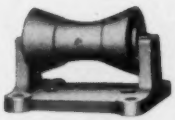


Adj. Pipe Roll with Base
Fig. 274
Without base: Fig. 275
2 to 30 in. pipe

Adj. Swivel Pipe Roll
Fig. 174
2½ to 12 in. pipe



Adj. Pipe Roll
Fig. 276
4 to 30 in. pipe



Pipe Roll Complete
Fig. 271
2 to 30 in. pipe

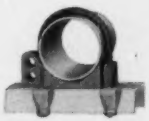
Single Pipe Roll
Fig. 171
1 to 30 in. pipe

pipe saddles

Pipe Stanchion Saddle
Fig. 259
4 to 36 in. pipe

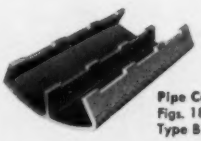
Adj. Pipe Saddle Support
Fig. 264
2½ to 36 in. pipe

Pipe Saddle Support
Fig. 258
4 to 36 in. pipe



Anchor Chair
Fig. 197
4 to 24 in. pipe

Pipe Covering Protection Saddle
Figs. 185, 186, 187, 188
Type A for 10 in. and smaller



Pipe Covering Protection Saddle
Figs. 185, 186, 187, 188
Type B for 12 in. and larger

Write for Hanger Catalog

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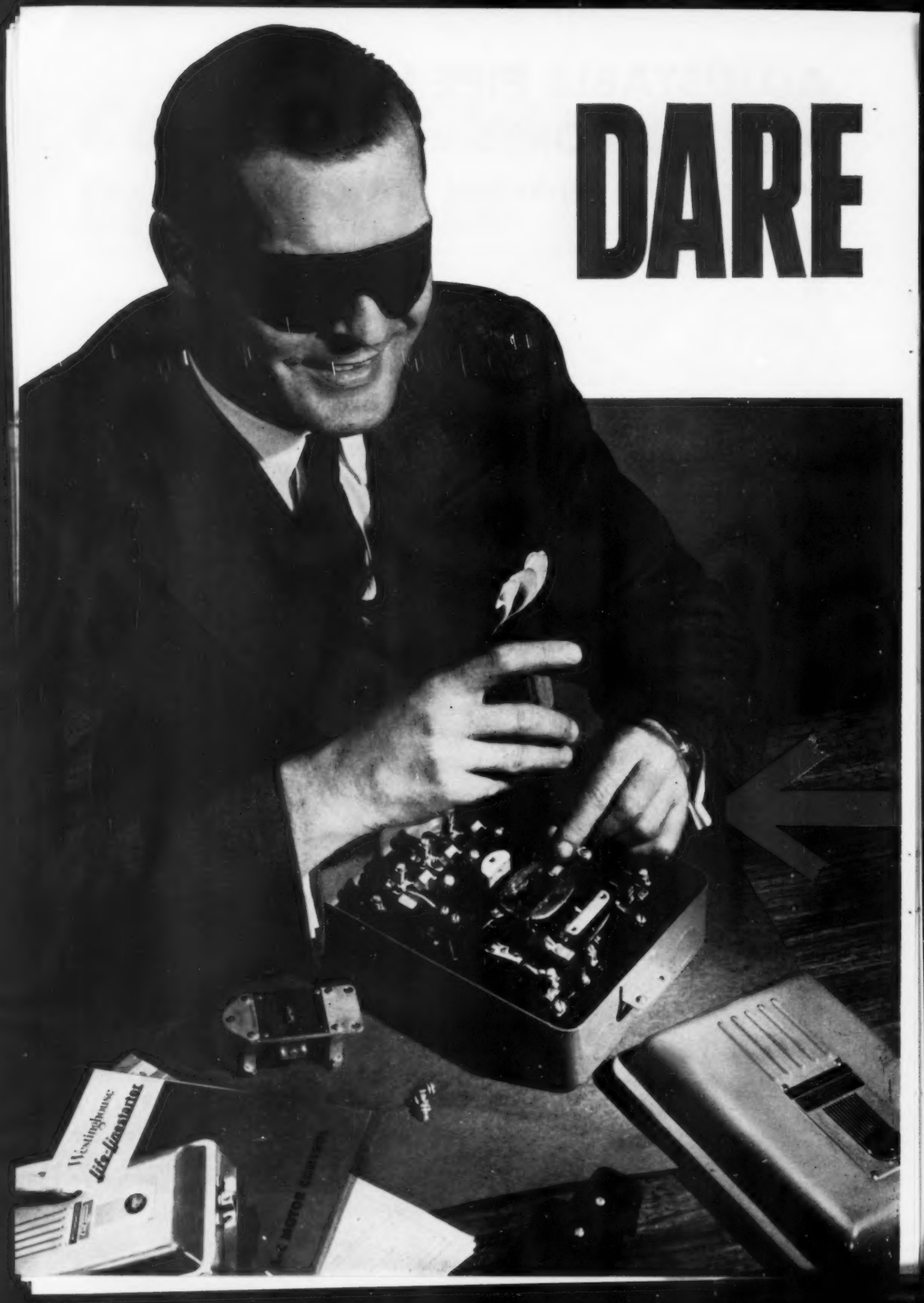

DARE
Westinghouse
Lite-Finisher

TO COMPARE !

The Simplest...

Compare the fewer moving parts—the easy installation—straight-through wiring that simplify the Life-Line design . . . See the uniformity of line and interchangeability of parts . . . Watch how quickly parts are front-removable. So simple. You can do it blindfolded! Which means—simplified maintenance!

The Toughest...

Compare the rugged construction of the enclosure which is Bonderized* and finished with baked grey enamel. Rust resistance that lasts a lifetime . . . See the positive protection that Life-Line offers with the patented "De-ion*" Arc Quencher that stops contact pitting and provides greater arc interrupting capacity . . . Watch how the bimetallic relay gives snap-action overload protection.

The Most Dependable Linestarter Ever Built!

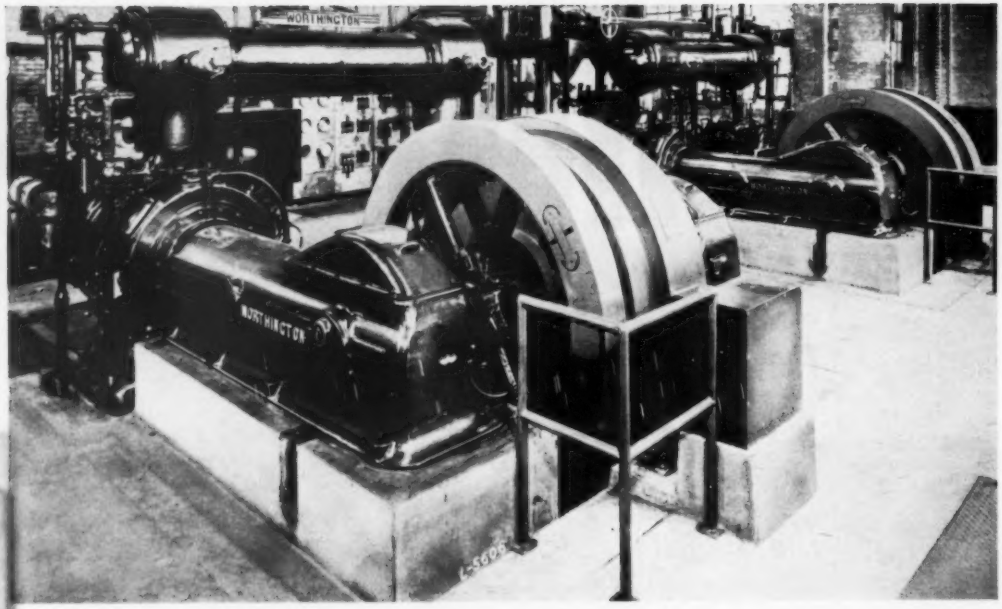
Read what this chief electrician of a large southern paper mill* says: "The Life-Linestarter, through a foot-operated pushbutton, starts and stops the motor four times a minute, 24 hours a day, 30 days a month. After at least a million cycles, contacts showed little wear."

SEE FOR YOURSELF!

Ask to see the "Strip-Down" Test. It will open your eyes to Life-Linestarter's stepped-up performance and maintenance. Your Westinghouse salesman will show you. Or send for, "Tomorrow's Starter Today", B-4677. Write: Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

*Name on request

J-30096



Link-Belt "Hooks Up" with Worthington Air

You can't find a compressed air need that Worthington can't fill.

This installation pictured above is a Worthington DC2 air compressor in Link-Belt Company's Pershing Road plant in Chicago. And that picture could be duplicated all over America where engineering-wise plants insist upon dependable, trouble-free, low-cost air.

One reason is—*only* Worthington makes air compressors with the Feather* Valve. Any other valve is complicated beside this Worthington exclusive. Feather* Valve is the simplest, lightest, most efficient ever made.

Then there's Worthington automatic variable capacity control—acknowledged the most accurate, flexible and simple control obtainable. And Worthington's high-efficiency intercooler that needs less water, less power, less attention.

Build around these features with sturdy construction . . . back up the machinery with Worthington application engineering—and you have plenty of reasons for deciding *there's more worth in Worthington*. Worthington makes all auxiliary equipment, too. Worthington Corporation, formerly Worthington Pump and Machinery Corporation, Compressor Division, Buffalo, N. Y.

WORTHINGTON

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K.I.9

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YALE WORKSAVER Electric Trucks are ideal where size and weight make big trucks impractical...over low-load floors; in freight elevators; railroad cars and trucks.

Industry prefers YALE WORKSAVERS because they offer big-truck efficiency for less cost, plus these big truck advantages: forward and reverse power travel...powerful hydraulic lift.

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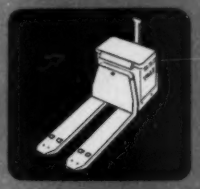
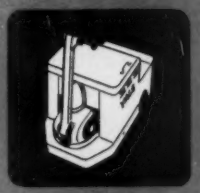
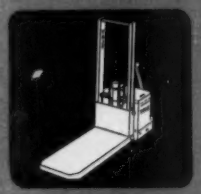
MAKE THE MOST of your manpower ——one part-time operator and a YALE Worksaver transport, lift and stack multi-ton loads safely, surely and smoothly.



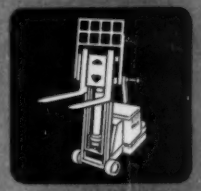
Pallet Worksaver



Tractor Worksaver



High-Lift Platform Worksaver



High-Lift Fork Worksaver

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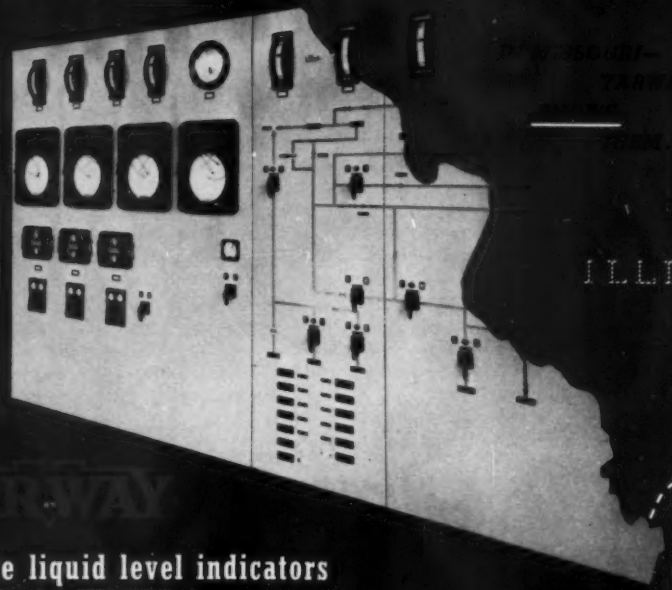


remote liquid level indicators

YARWAY SERVICE GOES ALL THE WAY...

Models of Contour Maps Aid in Site Planning

Contour maps of surface topography and sub-surface topography are easily made and may save thousands of dollars in plant cost . . . Instructions for making models

By DAVID A. GRANLEY, Manufacturing & Engineering, General Foods Corp.

ANY CHOSEN SPOT on the earth's surface has the individuality of a human fingerprint. The loops and whorls and scars are expressed on a topographic map by the contour lines connecting points of equal elevation. Whenever a decision has been made to relocate an existing facility or establish a new one on some selected spot, this "personality" becomes of considerable interest to the plant family it is joining.

The choice of geographical location is chiefly influenced by transportation facilities, the relation of the site to raw materials and markets, and the availability and stability of labor supply. Planning of building locations upon the chosen site, and especially the selection of floor elevations, requires the careful evaluation of a large number of factors, and has a direct and often material bearing on the out-of-pocket expense of developing the project.

Of even more consequence, it indirectly but significantly determines the percentage of future site utilization and the efficiency of communication between the buildings that will comprise the ultimate, fully-developed property. A mere inspection of the site very rarely will be enough to determine the intricacies of the surface with the proper accuracy. It will almost never give anything but a superficial impression of subsurface conditions.

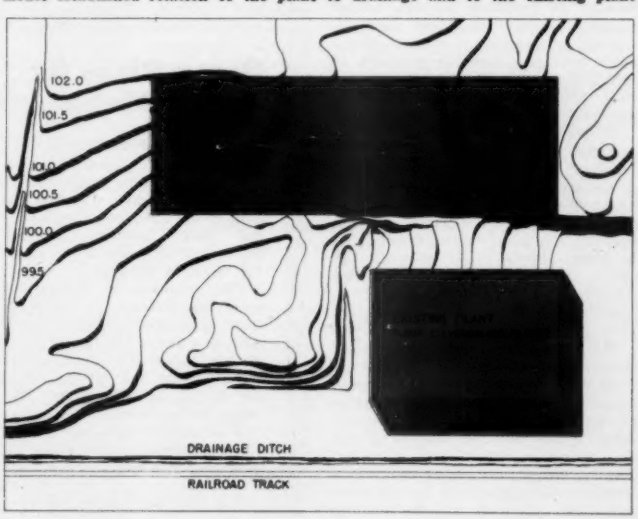
It is not intended to minimize the importance of a close personal inspection of the site. Among the factors that can and should be observed are the relation of the property to its surroundings; the character, color, and density of vegetation; the amount and distribution of topsoil and the type and feel of the subsoil. Also important is the general geology of the area that can be determined from the railroad cuts, highway ditches, and stream banks. Personal inspection contributes significantly to the compilation of data needed by management to make the wisest possible final decision.

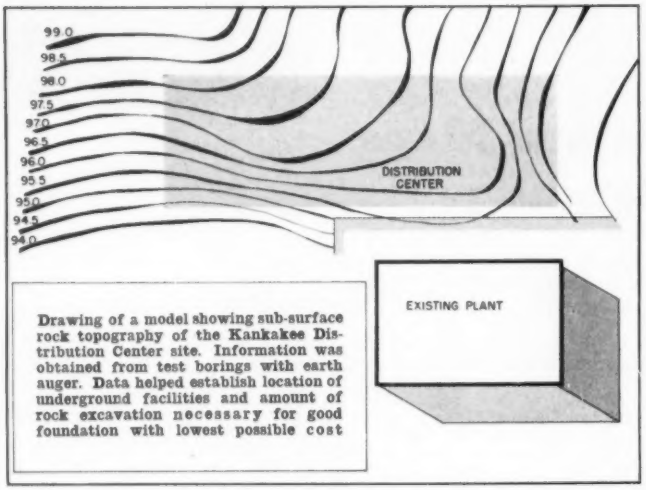
To permit detailed study of the property the first step is to secure a survey containing the border description expressed in bearings and distances; and a complete grid of elevations. Special note should be taken of significant features such as railroad tracks; roads; abrupt changes of elevation; inverts of sewers, drains and water supply; existing buildings; pole lines; and encroachments on overhead clearances. All existing easements, which limit free use of the property, should also be well defined.

The size of squares laid out for the elevation grid and the contour interval are a matter of judgment in each case. However, with relatively uniform terrain, elevations taken at points a hundred feet apart may suffice. Where the slope of the ground surface is not uniform to the eye, points fifty feet apart are preferable. The resulting checkerboard of elevations, when plotted on a map showing the boundaries and significant works-of-man, forms the basic data file. It helps to answer the questions concerning the surface drainage and building location that arise during the planned development of the property.

Additional data are necessary for a selection of an economical and functional floor elevation. Rock can be both a curse and a blessing, and its presence or absence should always be determined. Where a heavy multi-story building is contemplated, rock close to the surface means a saving of many thousands of dollars in foundation costs. On the other hand, where a low structure is under consideration a rock ledge below the topsoil becomes a source of expense. It may require unexpected thousands of dollars in expensive blasting for utilities lines,

Drawing of the surface topography model used in determining location and position of new Distribution Center for General Foods, at Kankakee, Ill. The model established relation of the plant to drainage and to the existing plant





Drawing of a model showing sub-surface rock topography of the Kankakee Distribution Center site. Information was obtained from test borings with earth auger. Data helped establish location of underground facilities and amount of rock excavation necessary for good foundation with lowest possible cost

Making the Models

"To prepare the models the contours are merely superimposed on pieces of light cardboard, the outline cut with a sharp knife, and the boards glued together in their proper relative location. The result is a solid three-dimensional picture of the surface with sufficient exaggeration of the vertical scale to make the irregularities of surface plainly visible."

roads, tracks, pits and tunnels.

Fore-knowledge of the location of rock and its extent permits engineering planning to secure all its possible benefits, as well as ease the bad features of its presence—or absense as the case may be. It should also be noted that purchased fill as well as rock removal each cost money, though at different rates. Also, it must be kept in mind that the most economical floor elevation often requires that some rock excavation be made.

For the usual site, and light industrial buildings, data on rock is easy to obtain. A simple post-hole auger with a shaft extension can confirm or disprove the presence of rock. If rock is present further investigation will secure a grid pattern of its extent. A few selected holes located at building corners, under planned elevator pits, and near required excavation of similar character will give positive answers to questions concerning the conditions that will eventually have to be answered during construction.

To analyze and interpret the data secured from both surveys and borings, a contour map is usually prepared. To represent three dimensions upon a flat surface it is necessary to rely upon certain symbols and conventional representations. It is often found more desirable to carry the contour maps one step further and prepare models from them which make all facts available at a glance.

The photograph of the model showing a drainage ditch and railroad track is one that has been prepared to show surface topography in relation to an existing plant and upon which has been superimposed an outline of a proposed building. The accompanying illustration is a similar model prepared to the same scale and showing the topography of rock below the earth surface as determined by earth auger borings. The datum in the two models is the same. By comparing identical points along the perimeter of the proposed building between the two models it is easily possible to ascertain the amount of earth cover laying over the rock below, and correspondingly appraise with some degree of accuracy the amount of earth work required in the foundation and rough grading phases of the construction.

To prepare the models the contours are merely superimposed on pieces of light cardboard, the outline cut with a sharp knife, and the boards glued together in their proper relative location. The result is a solid three-dimensional picture of the surface with sufficient exaggeration of the vertical scale to make the irregularities of surface plainly visible. By the same method a three dimensional contour of the rock surface can be made.

In the layout of utility lines a handy extension of the same type of study is prepared by making a model of the thickness of earth over rock. The lines of piping when plotted directly upon the model show instantly if sufficient earth cover is available as a protection against frost without the necessity of digging into the rock, or the relocation of lines that may be made to avoid rock excavation.

We have found three-dimensional contour models to be of great help in economic studies and in the design of plants. However, the benefits to be derived are not limited to the engineer. They may also be realized by others who are interested in the particular project but who are not familiar with the site or not familiar with the interpretation of contour maps.

The model speaks a universal language. It interprets a complex problem and shows the project clearly.

Bonus Plans for British Maintenance

IMPERIAL SMELTING Corporation Ltd's Swansea Vale Works has adopted bonus incentive schemes which cover 90 per cent of the 750 production workers. Now, incentive methods have been adopted for the firm's maintenance workers.

For maintenance engineering jobs, rate fixing ideas or plans have been devised, and when a man is given a job by his foreman he is issued a card which is marked with the standard time for the job; he returns this card when he has finished the job.

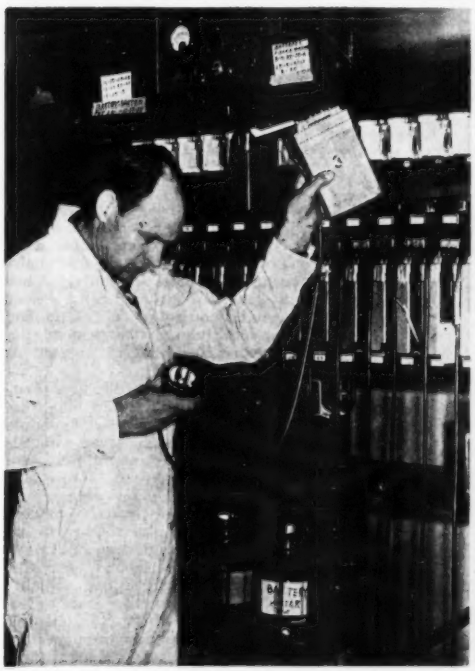
If a worker comes up against the unexpected he can consult his rate fixer and an adjustment can be made in the standard time for any extra work involved. In the case of workers such as plumbers or bricklayers, incentive plans based on time study of the fundamental units of work involved have been put into operation.

Time study men and rate fixers are continuously at work deciding time allowances, and have covered nearly every job in the plant, from cleaning yards to repairing pumps and rebuilding retorts and similar equipment.

Photos: Mine Safety Appliance Co.

United Air Lines inspector uses miner's safety lamp to examine repairs made on a DC-6 aircraft engine. In his left hand he holds a dentist-type mirror which enables inspection of parts which are not in direct line of sight

Batteries are recharged every eight hours and battery solutions kept up at this efficiently-operated lamp and battery charging rack located handily in the maintenance base



You Have to See 'em If You Want to Fix 'em

Two venerable instruments — the miner's lamp and the dentist's mirror—are new tools for maintenance men at United Air Lines

IF A COAL MINER on a flying trip had some time to kill in San Francisco and his bump of curiosity led him to United Air Lines' maintenance base, he would be in for a surprise. Inspectors and mechanics there have borrowed the traditional miner's safety lamp to provide brilliant light when and where they need it—in wheel wells, the "innards" of aircraft engines, wing and fuselage compartments or spaces—where overhead drop lamps or flashlights are frequently awkward to use or give inadequate light.

As an added work-aid the maintenance personnel have borrowed an idea from the dentists, too. They now use dentists'-type mirrors for examining points of an engine or out-of-the-way fuel connections not in the direct line of sight.

The Edison R-4 Lamp used by United Air Lines provides one hundred times more illuminating intensity than Edison's original model, and gives 25 per cent more light than the best cap lamp developed since.

United Air Lines men do not wear the lamps on their caps as do miners. Instead, reports an airline spokesman, the inspectors and mechanics carry the lamps around their necks, with the batteries in the pockets of their coveralls.

Safety experts prefer such lamps for other reasons, above ground or below. The lamp bulb is filled with gas and has two filaments of equal candle power. If one burns out the other remains operative. Should both lamp lens and bulb be broken, the bulb base automatically moves away from contact points, interrupting the circuit so that the filaments cool down and cannot ignite flammable gasses that may be present in the atmosphere.

Before they adopted the miner's lamp, technicians at United's San Francisco maintenance base used overhead drop lamps or flashlights. The Edison lamp proved more effective than flashlights, and eliminated the use of high-voltage overhead lights. They are designed to withstand rough conditions underground, and so can take the service usage at the air line's maintenance base in stride. The four steel-sheathed cells of the nickel-iron-alkaline battery are enclosed in a tough nylon plastic case, molded in one piece, which is resistant to abrasion, corrosion, oil, grease and moisture encountered in maintenance work. The battery is magnetically locked in the spill-proof case. The lamps are capable of burning continuously for a minimum of 10 hours on one battery charging. At the United maintenance base, they are charged every eight hours.

Study in Materials Handling

The Job That Timken Did—

Reduction of costs, labor and fatigue are the major gains at Timken because of its new MH set-up, but faster handling and greater safety are advantages of first line importance, too . . . Radio-controlled straddle trucks pick up and deliver loads without delay or confusion and on closely timed schedules . . . Special bolsters for transporting and storing bars and tubing, and new type bundling chains and locks, along with the straddle trucks, are the tools that have made this job one of the best-coordinated materials handling plans yet developed

"OUR MEN ARE LESS TIRED when they finish work. They like new machines and new ways. They are just as interested in new experiments as we are for they have seen a steady improvement in working conditions as a result of trying out new ideas."

That is the way a Superintendent of Material Handling began to summarize benefits of the system he has been instrumental in developing. He spoke of men even though he kept complete arithmetic records. When asked about these records, he said:

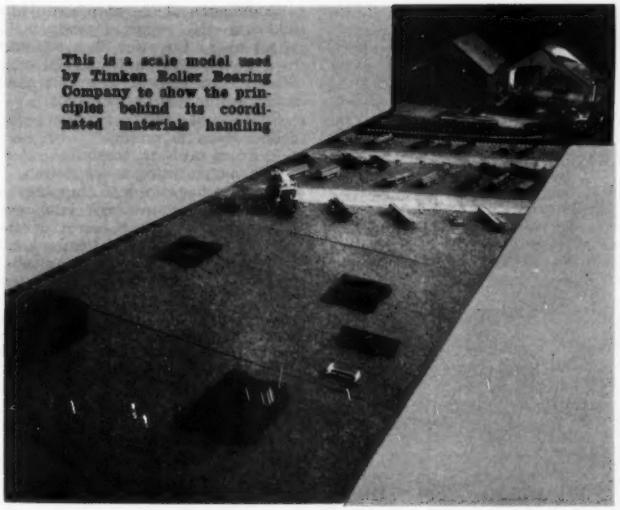
"Oh, yes, we can tell you how we save on production costs and increase production at the same time. But I'm proudest of the fact that our management believes our material handling program has definitely raised employe morale. Under our way the men are given tools to do the heavy work. And most of our men like to feel that they have a responsibility. They know the advantages of following safety rules and regulations."

This was Frank Wier speaking—Superintendent of Material Handling, Steel and Tube Division of The Timken Roller Bearing Company, Canton, Ohio. Pin him down and the figures ooze out of him. He's got charts and sheets covering everything from unloading high-test Brazilian iron ore and frisking a slag heap with a magnet for scrap, to bundling bales of material with high carbon chain and moving them with rubber-tired straddle trucks in and out of a steel mill. They handle by straddle truck 10,000 tons some days and average 7,800 tons daily. It is not uncommon for one man to move 125 tons of steel in one hour in the storage area with a lift truck that's just right for the job. But the figures seem much less important to Mr. Wier than the welfare of the men.

THIS WAS BEFORE: **Before the introduction of straddle trucks, inside floor space was piled high, frequently resulting in serious congestion in the plant and often in confused and tardy order-filling**

Material handling at this progressive Canton plant covers many different phases. This brief account will attempt to tie together such widely different component factors as the element of curiosity, wire, chain, a bundling lock for chain, overhead cranes, straddle trucks with specially designed cabs, a two-way radio control system, simplified paper work and a management that keeps an open mind to suggestions from its men.

Watching this operation as a spectator, one sees movement in all directions. On railroad tracks gondola cars bring in ore and scrap which is promptly unloaded, some of it with magnets handled by locomotive cranes working from above, and some by front-end loaders working from below. On the roadways and storage areas you see bulldozers, clam shells, loaders, and fork lifts, but most of all you see straddle trucks with their bellies full of steel bars or tubes—up to 15 tons per load. You wonder how the operators know where to set one load down



This is a scale model used by Timken Roller Bearing Company to show the principles behind its coordinated materials handling

and where to pick up the next one for they never seem to stop for orders. That's where the two-way radio control comes in. In addition, there are any number of overhead cranes, conventional trucks and trailers, and even motorized wheel barrows. If it lifts and hauls, pushes or pulls and is self-propelled, you can probably find it in this Timken Company plant.

To help in understanding this fast moving operation, the superintendent drew up a simplified list of procedures, pointing out, however, that there were exceptions for every step. And he added this comment which seems to contain a moral: "Our material handling men are interested only in movement, not in material. They know where every bale is located and their records show what each contains. Any bale can be picked up within a few moments after it is called for by the interested department."

This, then, is the basic pattern of material flow at the Canton plant of The Timken Roller Bearing Company:

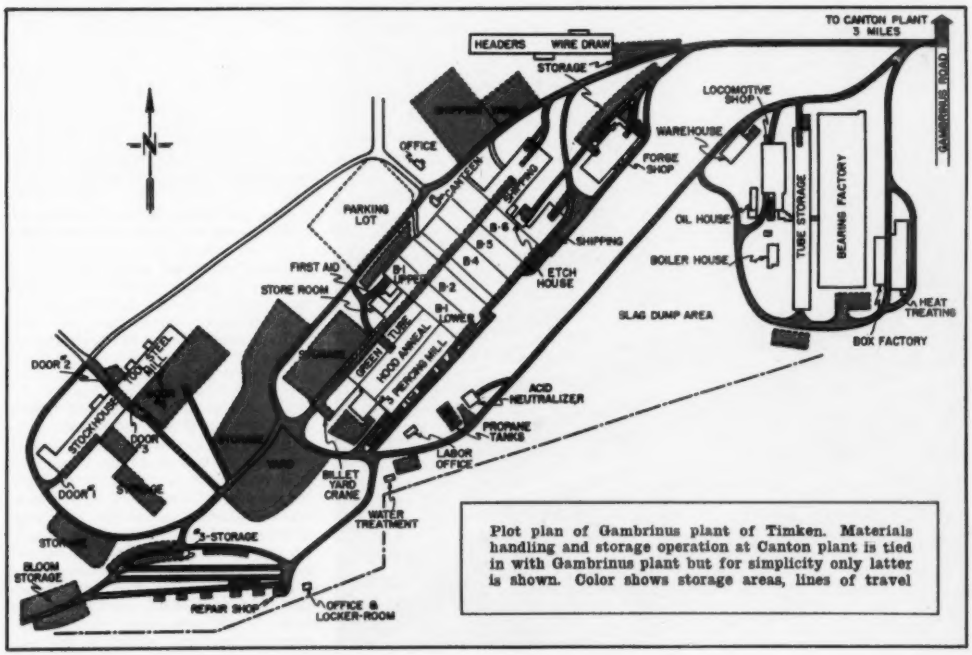
Steps using magnets chiefly

1. Raw material goes temporarily to storage yard or direct to melting department. Product—ingots.
2. From melting to 35 in. blooming mill. Product—blooms.
3. From blooming mill to conditioning. (For pickling, scarfing, grinding, removing surface irregularities.) Product — conditioned blooms.
4. From conditioning to 28 in. and 22 in. mills. Taken in by magnets. Taken out by magnets and chains to storage area. Product — bars and billets.

Steps using bundling chains and straddle trucks

(From this point forward the material is baled with bundling chains equipped with automatic bundle locks, two chains to each bale. Bales are moved by cranes and by straddle trucks which move freely in and out of buildings and make yard storage advantageous.)

5. From 28 in.-22 in. mills. Product—(1) Forging bars to customers' orders. (2) Billets for rerolling on 10 in. merchant mill. (3) Billets for piercing mills.



Plot plan of Gambrinus plant of Timken. Materials handling and storage operation at Canton plant is tied in with Gambrinus plant but for simplicity only latter is shown. Color shows storage areas, lines of travel

Straddle truck moves in over bolster which holds the bales to effect a pick-up

Outside storage reduces cost and helps housekeeping. Trucks are radio controlled

Comment: The merchant mill makes a wide range of products. It is set up to turn out 25 to 40 sizes in a week's time and material handling has to keep feeding it on close schedule for fast performance.

6. Piercing mills. Product — hot rolled seamless tubing.
7. From mills to finishing.
8. From finishing to inspection.
9. From inspection to shipping.

Plant layout involves long and short hauls and the secret of the operation is to break heavy loads into lighter loads, to move smaller loads faster and oftener, and to use single tier, horizontal yard storage in place of multiple tier, vertical inside storage. These yard storage areas are marked with letter signs on steel posts higher than any snow bank so far experienced, and the individual parking spaces are marked with numbers. For example, B-3, N-7, M-26. All building units are connected with roadways and plant railroad facilities.

Straddle Trucks Travel

The material handled includes ingots, blooms and bars up to 40 ft long with cross sectional measurements from ¼ in. to 24 in.; tubing 14 to 50 ft in length and from ¾ to 11 in. in outside diameter, and miscellaneous material including production scrap, lumber, chains, bolsters, portable platforms, oxygen and acetylene tanks, machinery, building materials, etc. One of the major straddle truck movements covers 3 miles between the Canton and Gambrinus plants. One covers 1½ miles and another 1 mile. There are many half-mile movements, some of 500 ft and one of 75 ft.

It is now standard practice at The Timken Roller Bearing Company steel plant for bars and tubes to be assembled in bales weighing up to 10,000 lb each. The bale is held together by two bundling chains equipped with bundling locks and each bale is carefully coded. Formerly this material was moved from place to place by conventional highway type trucks and trailers supplementing overhead bridge cranes and standard gauge gondola railroad cars running on tracks through and connecting the main building. The former method can be described as follows:

Old Method

Control of the various movements was exercised by personnel employed in several departments, which resulted at times in conflict and stagnation of the material flow. Since all railroad cars and trucks were unloaded inside the buildings, the material last received was placed on top of the stock pile. This caused a great deal of lifting and relocating piles by cranes to find certain orders. Bales of steel were sometimes lost. There was lost motion and wasted time and effort in the mill

partly because of the complexity of the scheduling method used and partly because of the congested piles of material which resulted.

Curiosity and imagination then went to work, for the material handling and operating men were not bound by tradition. If they thought helicopters would work, or straddle trucks—such as were being used at big western sawmills to handle lumber—they knew they could experiment. Accordingly, a straddle truck was purchased and put to the test. And what a test it was!

First Experiments

At first, experiments were made with single bolsters or pallets but the one bale pick-up was too light. Then plant mechanics built a bolster which could hold three bales of material weighing up to a total of 15 tons. A bale can be any length but not over 5 tons in weight and not over 30 in. in diameter. By trial and error the present rugged but relatively light three-bale bolster was perfected.

It was soon found that use of these straddle truck bolsters as compared to conventional trucks also added to the efficiency of overhead cranes. Unless motor truck and crane could be scheduled to arrive at a given point precisely at the same time there was delay. Such precise scheduling seldom happened because continuous production operation is of first importance and cannot be synchronized to fit the truck driver's schedule. Accordingly the truck and the driver often would be tied up until the crane was available.

The cost of this idle time included investment in truck and wages of driver. When straddle truck bolsters were introduced the cost of waiting time was reduced to almost nothing for the bolster was inexpensive to begin with and it tied up no driver or other attendant during waits. Compared with railroad cars, bolsters carried 1/6 of a carload and cost 1/50 as much. Therefore, by use of the straddle truck bolster the material handling men achieved the greatest utilization of cranes at the lowest cost.

Next they turned the searchlight of curiosity on the tieing of bales. The Timken Roller Bearing Company bought and used a great deal of bundling wire—$25,000 worth of it annually. (At today's price that would be nearer $40,000.) True, wire was light and it came in coils that preshaped it before it was cut to tie around a bale. But it couldn't be used more than once and new wire had to be wrapped and twisted shut each time a bale was processed. On top of that, the once used wire had to be handled again—cut into short lengths—before it could go to the furnace for melting as scrap.

The cost of this preparation equalled the value of the wire. That left the original cost of the wire charged against operations. Yet baling wire was widely used in addition to 9,000 ¾ in. bundling chains weighing 50 lb each which were already in use. These chains were made of low carbon steel and had to be replaced at the rate of approximately 3,000 per year. But the men who were experimenting found that as long as they continued to use wire no progress could be made with bolsters and straddle trucks. For one thing, bales held together with wire could not be picked up with the wire which was used only as a retainer. They were so close together that they could not be removed by anything but a magnet.

As a result of these observations, the material handling men wanted to use all chain and no wire. But management thought chain too high priced for this service. They pointed out that the chains were loafing except when the bales they contained were actually being lifted. They believed chains would not be used often enough.

Challenged by this theory the material handlers worked out an idea. The idea was that bundling chains have two functions—to lift and to retain. To lift means wear, but if used simply to retain, chains could last practically forever. In a service that combines lifting and retaining, chain could be used over and over again. Gradually the material handlers worked out an equation on the cost of chain which went something like this: "Chains could lie idle retaining a bale without a pick-up for 50 days before the interest on the investment at 6 per cent equalled the principal cost of wire which is used once, then destroyed."

When the truth of this equation was established by cost records it became the keynote of the material handling men. As a matter of fact, bundling chains would be a profitable investment even if used on bales that moved only every 50 days but in actual practice they average one move per day. Once convinced, management approved sufficient bundling chains and today only a little wire is used for special purposes.

These are bundling chains and locks which, along with the straddle trucks, have been responsible for the success of Timken's new system of materials handling

Bundling Chains

Going to bundling chains gave the handling and storing of bales of rods and tubes greater flexibility. They could be stored closer together and they could be picked up more easily. But the method of fastening chains required a great deal more curiosity. Pear shaped links were attached to each end of the chain and one slipped through the other to make a noose. A "hair pin" was used which clipped two adjacent links together keeping them in place without slipping or loosening around the bale.

Some time previously the design of chain was modified to permit easy access of a single pin with a flat parallel head something like a paddle. That was very good as far as inserting the pin into the adjacent links. But have you ever hunted for a pin on a bedroom floor with your shoes on? Well, try to find one on the floor of a steel mill or on the ground in an outside storage area! Although there were delays in locating pins for the bundles, the Timken people were determined to eliminate the use of any wire.

In order to make chains even more desirable, Mr. Wier insisted that a better method be developed for retaining a bale by means of chains. This led to extensive experimenting and engineering, as a result of which a new bundling lock was developed that revolutionized

handling and storing steel at the Timken Company plant. One end of the chain was fastened to the bundling lock. The other end was then passed under the load and up through the lock. When the chain was hooked and lifted a "dog" on the lock dropped around the next link, holding it tight while the bale was in storage.

This, of course, eliminated pins and led to further curiosity about the chain itself. The long-link, low-carbon "pin-up" chains weighed approximately 50 lb each, and even if a man lifted only one end of the chain he lifted at least 25 lb. As two chains were used on each bale, the man lifted at least 50 lb in fastening each bale. Accordingly, short link high carbon steel chains were introduced three years ago and the first ones are still in use today. They are much lighter in weight (27 lb) for the same strength, and their links are shorter and therefore wrap closer.

Meantime they were making progress in other directions. The bolsters were perfected and the engaging devices below the straddle truck were improved. Because the straddle truck was being tested in year-round use, the cab was redesigned for the driver's comfort in freezing weather without shutting off his view of the ground below him. Obviously there couldn't be a solid floor. Since the straddle truck would run in and out of buildings with equal ease, bales were carried to outside storage areas, thus opening up congested space inside the buildings. Management was pleased with the ability of the straddle truck to correct quickly shortages of materials at machines and relieve congestion on peak loads, and in due time authorized purchase of additional straddle trucks.

Today they operate a fleet of eleven on a 24-hour schedule. Roadways were widened and outside storage areas leaveled off with the mill's own slag providing cheap but excellent heavy ballast and top surfacing material. Gradually there was developed a pattern of storage spaces set at angles to the roadway like cars parked on Main Street. Each angle was lettered, each space numbered.

Having found the way to wrap bales in chains and to fasten them with bundling locks, and having evolved the best type of bolsters to hold the bales, and having proved bales can be lifted and transported swiftly and economically with straddle trucks, a way had to be found to control the movement of these trucks without a messenger chasing after them. Two-way radio was the answer. With this simplified radio dispatching system the paper work has also been streamlined.

Bundling chains make for easier handling of steel bars, other material via crane

Dollars and Sense

Figures? Here are a few. An overhead crane costs approximately $75,000 and a lift truck approximately $7,500. Cost of new buildings runs into major figures. A straddle truck like these comes to around $13,000 and the bundling chains that make it so handy cost about $12 each.

Incidentally, there are now 15,000 bundling chains in use and at the start of each shift Henry E. Parks, Chain Coordinator, wants at least 900 of them free and clear. He says the chains are used constantly after the bales get inside the shop or plant and they stay with the bales until they reach the shipping department. Under the straddle truck system the material handling department hasn't delayed a production order in two years, and they haven't lost track of a load. Three new all-time production records were made in one mill in one year.

While the changes were being made in the material handling system, improvements in manufacturing methods were being worked out by the operating heads of other departments. Combined results accounted for a 15 per cent increase in plant output. As for storage costs—one ton of steel one day costs as follows:

By overhead crane—	
In a railroad car	**0.037**
In a warehouse shed	**0.027**
By straddle truck	
Outside	**0.000056**

The area used to lay down steel covers 20 to 25 acres. "We don't pile anything. We spread it out."

"Snow? We had 87 in. of it one winter and didn't have to shut down once."

The net results are greater efficiency and lower production costs combined with smoother and easier working conditions.

One of the men who has been there a long time summarized the situation in these practical words: "This change-over cleaned the entire plant of scrap wire, pins, timbers, pipe, etc. It added to safety precautions. Today this plant is an example of good housekeeping throughout. There's a place for everything where it can be got at and everything is kept in its proper place. With our mobile equipment we can and do operate on perfect timing—all operations producing at maximum capacity, minimum cost.

Industrial Lighting Developments

These 3 Merit Award Entries Tell How:

1. **One company improved seeing task of plant employees;**
2. **Machine shop lighting was improved;**
3. **Company converted area formerly used for foundry.**

GOOD ILLUMINATION is important in that it permits flexibility in the layout of machinery and equipment and enables plant to get best utilization of floor space. It also provides greater accuracy in workmanship, enabling the worker to see minute details which would be difficult under poor illumination. Good lighting also boosts the morale of employees: it encourages cleanliness in the plant and provides greater safety.

The quality and quantity of illumination are also important. These particular points were especially brought out in the entries submitted by the 409 winning contestants in the Merit Award Competition, which were announced at the Fourth International Lighting Exposition and Conference, held in Cleveland.

The 409 winners sent in 287 entries which fell under the following types of installation: industrial lighting, school lighting, office lighting, store lighting and miscellaneous lighting installations.

The following three industrial entries were selected and are presented here to show the problems these companies faced and the solutions which were suggested.

Seeing Task of Workers Improved

Entry by: Harold P. Howe and Louis E. Mueller, The Detroit Edison Co., Birmingham, Michigan

Objective: The Allegheny Ludlum Steel Corp. believes that the seeing task of their plant employees is as critical as the office force. They, therefore, desired to re-light a portion of their plant with a system of equal quality to a modern office. A test area of 40 ft by 80 ft was chosen to act as the guide for the re-lighting program.

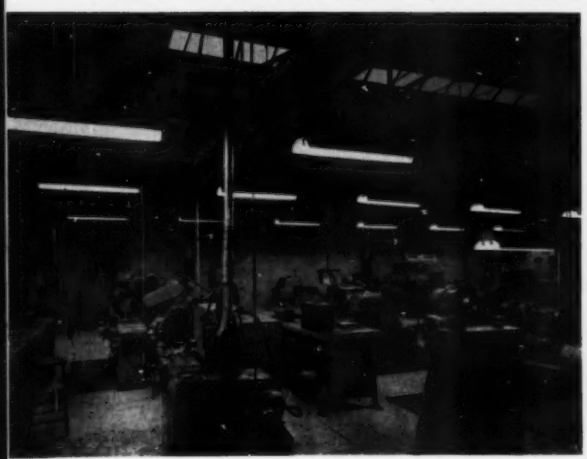
Proposed installation: To soften the shadows by having light come from all directions, a layout using a grid system of fixtures was submitted. This also provides for flexibility of machine arrangement. The type of fixture specified was one that had an upward component of light which provides better seeing comfort and improved self-maintenance of the reflecting surface. Shielding of 35 deg crosswise and 25 deg lengthwise was specified to insure low brightness in the glare zone.

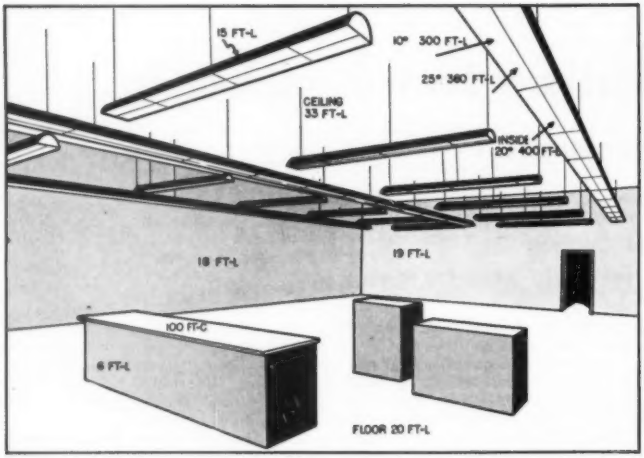
Suggested Luminaire: The fixture selected was the Curtis Challenger No. 3526-CLH. This met the company's specifications and was installed in accordance with the layout submitted. A 10 ft mounting height was selected to clear the crossbeams and the bus duct.

Results of Installation: Brightness readings were taken after 500 hours of burning. These are noted in the sketch. The highest brightness in the

BEFORE This is how work area looked before company installed the improved system of lighting

AFTER With new installation the brightness ratio is now 12 to 1, formerly ratio was 360 to 1





Sketch shows brightness readings which were taken after 500 hours of burning

shielded zone is encountered in viewing the inner surface of the reflector at an angle of 20 deg to 1 ratio specified for most general office jobs.

An interesting comparison between the old and the new lighting system is that of brightness ratios encountered in the ceiling area. The old system had a ceiling brightness of 1 ft-L and a fixture brightness of 360 ft-L which is the same as a ratio of 360 to 1.

By providing an upward component of light from the fixture in the new system, the ceiling brightness was increased to 33 ft-L while the fixture brightness was held to 400 ft-L. The resulting ratio of 12 to 1 is a decided improvement.

The company now has a model lighting system having the quality and quantity of illumination they desired. It is their plan to expand this system in re-lighting their entire plant sometime in the foreseeable future.

Foundry Shop, Then—Assembly Line, Now

Entry by: E. M. Wenner and F. A. Yokel, Duquesne Light Co., Pittsburgh, Pennsylvania

Objective: The Lewis Foundry and Machine Division of the Blaw-Knox Co. obtained a war contract for the assembly of anti-aircraft guns for the Navy. It was necessary to provide additional space for the production and assembly of steel mill machinery. It was recognized that both operations involved close visual tasks and that lighting would be an important factor in the production level, the workmanship and efficiency of the employes.

Former arrangement: The space selected for these operations was being used for a foundry. The problem was to convert this area and install lighting for the above purposes. It would be necessary to install the lighting fixtures above the cranes involving a mounting height of about 40 ft. In view of this mounting height and the large area, the installation would represent a substantial investment to provide the quality and high level of lighting required.

Suggested arrangement: The foundry equipment and facilities were removed and a new concrete floor was installed. Walls, girders, trusses and the ceiling were cleaned and repainted.

Luminaire: Guth high-bay Alzak aluminum reflectors No. M3810 were installed, using 3000 w mercury vapor lamps. Units were mounted on the beams in stagger fashion. The mounting height is 41 ft, and units are spaced 27 ft by 32 ft. The average level of illumination resulting from this installation is 37 ft-c.

BEFORE This is how foundry area looked before conversion to handle assembly of anti-aircraft guns

AFTER This shows area after foundry facilities were removed and new concrete floor was installed

Improved Lighting for Machine Shop

Entry by: Leonard H. Gussow, Harley, Ellington and Day, Inc., Detroit, Michigan

Objective: Goddard and Goddard wanted to provide good general lighting for an addition to the machine shop producing fine quality cutting tools.

Original installation: The area immediately adjacent to the new addition is shown in one photograph. Ceiling height is 14 ft, and monitors provide some daylight. Four 3-lamp 40 w open end RLM units were installed per bay (20 by 20 ft), mounted 8 ft 6 in. above the floor. Room finishes were dark. General illumination was very spotty with a reading of 9-25 ft-c.

Brightness readings before installation were as follows:

Ceiling	0.4-0.9 ft-L
Monitor (dark day)	100 ft-L
Walls, Columns, Machines	1.4-3.5 ft-L
Floor	1.2 ft-L
Fixtures (in normal view)	900-1200 ft-L

Results of installation: The general area is approximately 160 by 80 ft, with a 14 ft 6 in. ceiling. Walls are cinder block, painted light green, and have 70 per cent reflectance. Columns are steel and ceiling is metal decking, all painted the same as the walls. The floor is wood block, natural finish, 50 per cent reflectance. Machine tools and other equipment are, in general, machine gray, of 40 per cent reflectance.

Suggested Luminaire: Standard RLM slimline fluorescent fixture, open ends, porcelain enamel reflector, 3-75 w 96 in., T-12 standard white lamps, 425 ma high power factor stroboscopic-corrected ballast, DayBrite No. 91381.

Small adjustable incandescent fixtures were installed on machines to provide higher levels at point-of-work.

Illumination after installation:

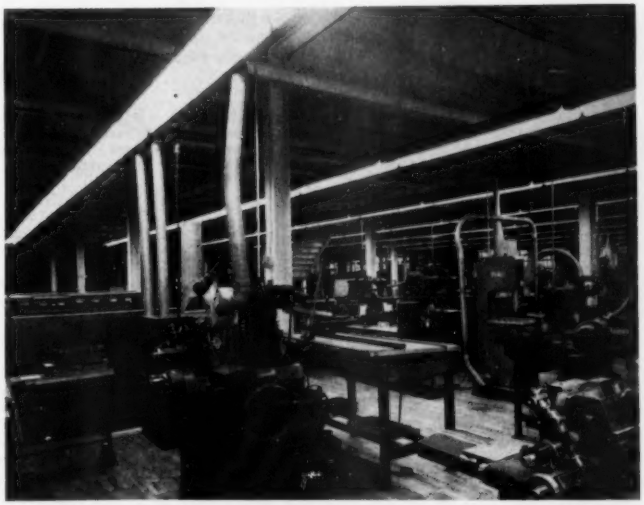
General	85 ft-c
At point of work	12-20 ft-c
At point of work (with local incandescent lamps)	100-800 ft-c

Brightness readings after intallation:

Ceiling	4-9 ft-L
Walls and columns	14-30 ft-L
Machines	3-7 ft-L
Floor	16-22 ft-L
Fixture (in normal view)	50-450 ft-L
Fixture—crosswise (lamp)	1700 ft-L
Fixture—lengthwise (lamp)	1400 ft-L
Side of fixture	4.5 ft-L

Because of the conspicuous improvement of the new installation over the old, the management is proceeding to remove the old fixtures and plans to extend the new layout throughout the plant. This is another good example of how visual evidence can do a good job in any plant.

This is the area immediately adjacent to the new addition. Ceiling heights is 14 ft. Although monitors provide some daylight, general illumination was very spotty



This is the area in which the new lighting system was installed. Ceiling height is 14 ft 6 in. Columns are steel and ceiling is metal decking, all painted light green

Are Shaft Currents

Bearing insulation placed on the outboard end of a large direct current motor, as pointed out by the author, prevents the flow of potentially dangerous currents

By C. D. LAWTON, Motor Generator Section, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

OCCASIONALLY A PLANT OPERATOR will experience an unusual type of motor bearing trouble, identified by slow pitting, general deterioration and eventual failure. It happens to anti-friction as well as sleeve type bearings. The process may take up to three or four months' time before it is noted. Upon checking, motor alignment and rotor float are found satisfactory, and there is no vibration. The rotor is properly located in its magnetic center. So new bearings are put in, but the same process of bearing deterioration repeats itself. The trouble cannot be explained and the manufacturer is consulted. The trouble—shaft currents.

Shaft currents, as the name implies, are currents flowing in the circuit composed of the shaft, bearings, and base (or yoke) of the motor or generator, Figure 1. If of sufficient magnitude, these currents will damage the bearing surfaces, and in severe cases will cause scoring of the shaft and lead to ultimate failure of the bearings. These currents may be of line frequency or some multiple thereof, or may be of slip frequency or some multiple thereof, or may be of both line frequency and slip frequency.

The principal cause of shaft currents is the linking of the shaft by alternating fluxes, due to dissymmetry

Fig. 1. Colored line shows path of shaft current flow of a pedestal bearing motor. A bracket or housing bearing machine would have similar current flow, except it would be through the bearing supports or brackets and stator yoke

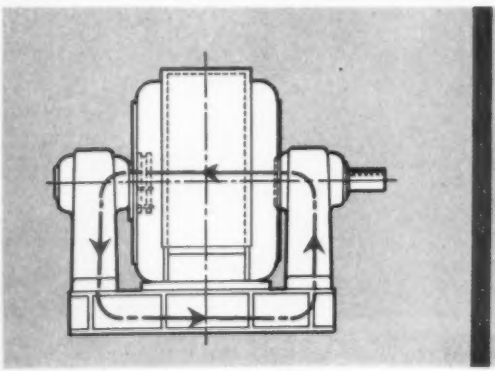
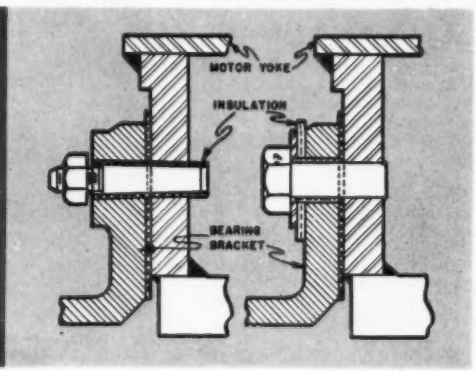


Fig. 2. One method of breaking shaft current circuit sometimes used on bracket or housing bearing machines is shown here. Disadvantage of the method is that the machine is more readily subject to shorting by dirt, oils and paints



First thing to do is to check your bearing insulation; if it is defective or inadequate this can be the cause of shaft currents and subsequent bearing failures . . . Several ways of insulating bearings against deteriorating effects of shaft currents are described, illustrated here

Eating Up Your Motor Bearings?

in the magnetic circuit. Flux from each pole crosses the air gap and, if the magnetic path is symmetrical, will divide equally, half going in a clockwise direction and half counterclockwise. However, if the reluctance of the core is different in one direction than the other, the flux will not divide equally, and there will be a net flux linking with the shaft. Variations in reluctance due to the joints between segments of the stator and rotor core (where segmental punchings are used) are the primary source of shaft currents. Whether or not shaft currents are to be expected depends on the combination of the number of segments and the number of poles. By the same reasoning, it is known that sectionalizing the stator (as on very large machines) may give rise to shaft currents.

Ring Punchings Help

The use of ring punchings minimizes the chances of shaft currents. However, insulation of the bearing opposite the coupling end will provide protection from any possibility of shaft current. It is common practice to insulate bearings in all machines where shaft currents are likely, which means in most machines with segmental punchings, and also in many machines with ring punchings, as an added precaution tending toward increased reliability. On machines with a single shaft extension, insulating the bearing opposite the coupling end provides positive protection against the flow of shaft currents. On machines with double shaft extension, both bearings must be insulated. When both motor bearings are insulated, there will be no bearing currents in the motor being protected. The shaft voltage, however, still exists and could be the source of damaging effects in the bearings of the connected machines.

The voltage which causes the shaft current appears across the ends of the shaft. Insulating the bearing presents an open circuit to this voltage, and therefore no current can flow. The oil film between the babbitt and the journal insulates the bearing to a degree, but it may take only a fraction of a volt to break down the oil film, and cause the intermittent electric discharges from the babbitt to the shaft. Such electric discharges may occur at a rapid rate in many places along the shaft journal at nearly the same time. The amount of current which would flow is affected by the type of oil being used in the bearing and the thickness of the oil film during operation.

The Job of Insulating

Bearing insulation is accomplished in a number of ways. On a bracket bearing machine, insulation can be obtained by using a material such as fish paper between the motor housing and the yoke, as shown in Figure 2. With this method the insulation is exposed to short circuit by lead base paint, which might be used in repainting the machine. Another method more commonly used, shown in Figure 3, is to insulate the bearing bushing

(Continued on page 196)

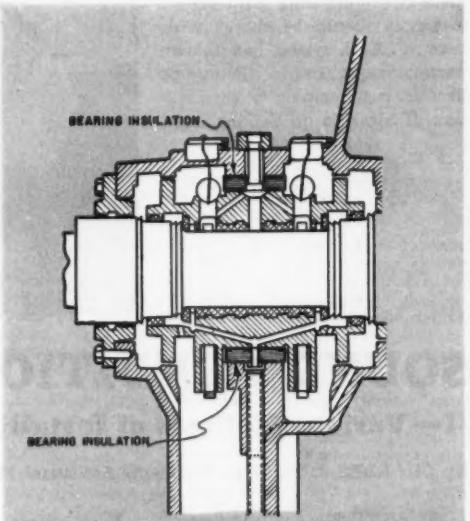


Fig. 3. Better insulation can be obtained by insulating bearing bushing itself on the inside of the bearing enclosure, as shown here. This type of insulating has replaced older method which is shown above in Fig. 2

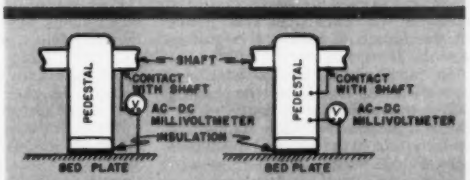


Fig. 4. Insulation can be checked by comparing reading A and B. If same, insulation is satisfactory. Insulation is defective if readings at B are lower than at A.

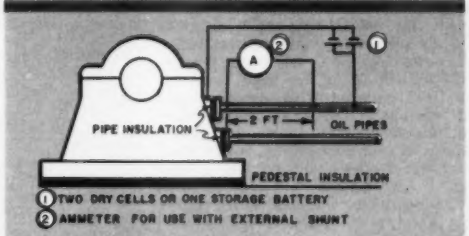


Fig. 5. Two batteries (1) and ammeter (2) can be used to check insulation when machine is in operation. If ammeter needle moves, insulated joint is defective.

The acoustical material is nailed to wood furring strips. Where ceiling is rough and uneven the strips should be shimmed so they are perfectly level

All Photos: Armstrong Cork Co.

Method of installing acoustical materials should be chosen with care . . . Each system has its own particular qualities . . . It may be necessary to employ a combination of ideas to do the job right

SOUND CONDITIONING

II—Various Methods of Installing Acoustical Materials

By CHARLES J. NOCAR, President, Acoustical Materials Association

JUST AS THERE is a best type of acoustical material for each job, there is usually a best way to install this material. Therefore, the method of installation should be chosen with care, as a wise choice of methods will save time and money in the long run and will result in a more serviceable installation.

In some plants, installation of acoustical material on the ceiling will prove sufficient in confining industrial noises to their immediate vicinity. In others, and smaller rooms, side wall treatment is frequently required to obtain enough sound absorption.

In many types of buildings where structural framework is exposed, the webs of the roof trusses supply a place for attaching acoustical materials and may make sound conditioning practical in areas where the underside of the roof deck is so fully covered with service lines of various types that ceiling attachments are far from practical. Material so applied forms sound absorbing baffles within the room which in themselves add to the efficiency of the material in preventing the spread of sound.

The first part of this article "Fewer Headaches with Sound Conditioning" appeared in the May 1952 issue, page 78.

Many plants have wood decks which make the installation quite simple while others have concrete decks which make it a little more difficult.

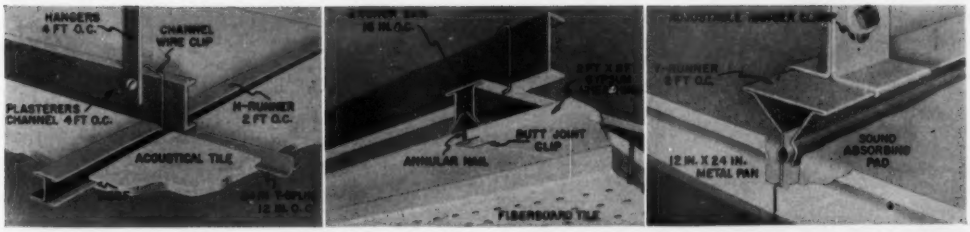
Because of these individual differences, it should be pointed out that the following methods describing installation of acoustical material cannot always be used as suggested. As each plant has its own particular physical qualities it will sometimes be necessary to employ different methods of attaching the acoustical material, or a combination of all the methods. These methods are suggested as possibilities rather than as standard operating procedure, and are covered in the general order of their costs from lowest to highest.

Cementing: In remodeling work, it is very often possible to cement acoustical tile directly to the plaster ceiling. This is the most common of all methods and usually the least expensive. The plaster, however, must be in good condition since cementing requires a smooth, solid base surface to apply the tile. Where the ceiling has been painted, a test should be made to determine if the adhesive will bond satisfactorily. The recommended test is to install a single tile, leave it up 48 hours, then remove it. If the paint has not softened, it is safe to cement.

Nailing to wood furring: Wood furring strips 1 in. by 3 in. may be used as a base for nailing or screwing the acoustical material where the ceiling surface is rough and uneven. The strips should be shimmed so that they are perfectly level. In new construction it is often possible to furr across the joists. Nailing methods have the advantage of slightly higher absorption efficiency. Building paper as a backing is used to avoid "breathing."

Cementing to gypsum lath: If the acoustical material is one that cannot be nailed, such as certain types of mineral wool tile, it may be best to install gypsum lath and cement the acoustical tile to it. This type of installation not only provides more rigid construction but has the added advantage of acting as a good fire stop.

Screwing to gypsum sheathing: Installing a perforated fiber tile material is best done by applying the material with screws to a base of gypsum sheathing. The use of screws in any installation is one of the most secure methods of attaching a material to the sheathing.



There are several methods for suspending mechanically acoustical materials. One of these is the H-runner system shown at left. Another is the method of suspending gypsum sheathing and then screwing the material to it, as shown in the center sketch. A third method is that of suspending a metal pan. This system allows the units to be taken down individually and moved for remodeling or for access to the pipes, air ducts and electrical wiring

Cementing to brown coat plaster: For an acoustical ceiling that is usually rigid and an excellent fire stop, tiles can be cemented to brown coat plaster. This method will also cut down sound transmission through the ceiling.

Mechanical suspension systems do much to eliminate problems of ceiling design, and they are adaptable to both old and new construction. They conceal overhead pipes, air-conditioning ducts, and electrical conduits producing a clean, modern appearance. Mechanically suspended ceilings are often used where old ceilings are too high. They are ideally suited to troffer-type lighting fixtures and the extra space made available above the ceiling simplifies the installation or repair of these concealed fixtures.

In addition, over-all lighting in the room is often improved by a lower ceiling with good light-reflecting properties. Suspended ceilings usually do a better sound-conditioning job because the absorbent surface of the material is brought closer to the source of sound. In many cases, they make heating systems more efficient by reducing the cubic volume of the room.

Mechanical suspension methods in old construction are likely to be more expensive than most others because of the extra time and materials necessary for each job. In new construction, however, money may be saved by eliminating plastering and other finishing. For example, ducts are concealed by the suspended ceiling for appearance.

The H-runner system: There are several good ways to suspend acoustical materials. One of the most economical is the "H-runner" system. This system is fast because the materials are attached directly to the supporting members. Acoustical materials must be kerfed and back cut to fit in runner.

Cementing to suspended gypsum lath: Sometimes it is desirable to suspend gypsum lath as a cementing base for the acoustical material to be used. This provides a non-breathing ceiling and a good fire stop. In the case of suspended mineral wool materials, this is probably the most desirable system to use.

Screwing to suspended gypsum sheathing: One of the best methods of suspending a fiber material is by suspending a base gypsum sheathing, then screwing the material to it. It results in unusually tight construction, a non-breathing ceiling and acts as a fire stop.

Cementing to dropped plaster ceiling: The use of a dropped ceiling of brown coat plaster and cement application of acoustical tile is approximately in the same cost range as the preceding system. This system provides a solid base, a non-breathing ceiling, and an excellent fire stop besides reducing sound transmission.

Metal pan suspension system: Generally speaking, the suspension of metal pan material is the most expensive system but it has practical advantages for many kinds of installation. Quite often this system is the most efficient for acoustical sound reduction. This special system allows the units to be taken down individually and moved for remodeling or for access to pipes, ducts and wiring. Access doors can be eliminated in this type of construction.

Through the proper use of acoustical materials, industrial plant and business office noises can be eliminated.

A mechanical suspension system conceals overhead pipes, air conditioning ducts and electrical conduits. It is adaptable to both old and new construction

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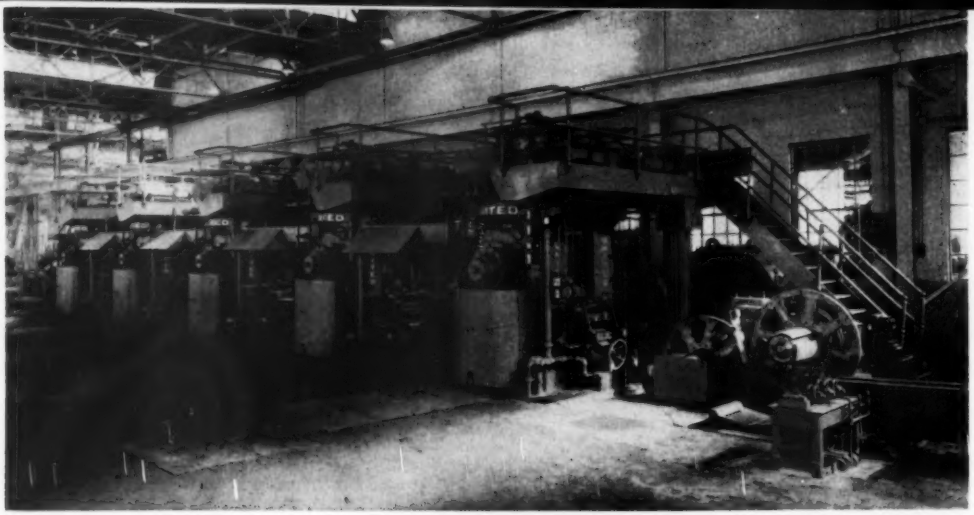


Photo: Cuno Engineering Corp.

Both the roll body coolant and the lube oil for roll necks, screw downs and pinion stands on this continuous cold roll strip mill are kept continuously clean with filters. One removes all solids larger than 0.005 in. from the coolant, handling about 500 gpm. About 90 gpm of lube oil is handled by the automatic filter; this removes all solids larger than 0.008 in.

OIL RECLAIM SYSTEMS

II—Case Study on How to Choose the Right Type for Your Plant

Here, the author shows how one plant went systematically about the business of picking an oil reclaim system specifically tailored to suit their needs . . . The same method may be employed by any other plant for determination of type and capacity

By WILLIAM C. O'CONNELL, Process Engineer

IN THE SELECTION of an oil reclaim system for a particular job, the plant engineer must be familiar with the job itself, the composition of the solution to be clarified, the contaminants, the amount of clarification necessary, and the capacity of the system. This last point evolves around whether to use a full-flow, partial flow, or batch type of system, whether to use single or tandem installations, and whether the operation must be continuous or can be shut down to clean and replace or renew the filter insert. The following example will illustrate the details involved in the selection of a system.

In this example, it was decided that due to the nature of the process a full-flow system was desirable. It was also decided to have the department do its own maintenance on the system. A report written after a complete investigation with the recommendation for the type system to use will illustrate the degree of investigation.

REPORT

Title — Reclaim System for Impregnation Fluid.

Introduction — An investigation was made to determine the selection of a reclaim system for our porous casting impregnation fluid. This fluid is of the following composition: 10 per cent diacetone alcohol; 90 per cent light oil (75 sec. light spindle); 50 Ssu viscosity.

The impurities consist of lint, powdered cast iron, and suspended graphite, as small as 2 microns in size. (A micron is 0.001 mm.)

Since water is readily soluble in the alcohol, water removal is not being considered, and since the alcohol has a low boiling point, heat cannot be used.

A check of the solution shows approximately 1 per cent solid content after one week of use. This was determined by the filtration of 100 gal of new liquid after one week of unfiltered usage. This 1 per cent when dry weighed approximately 2 lb and was removed from one-quarter of the solution of the entire system. On this basis, about eight pounds of contaminant would have to be removed weekly.

For economical maintenance, it is desirable to have a filter life of two months. The rate of flow will be 4 gpm. The filter must have the capacity to hold 80 lb of residue.

Since it is desirable to filter to a fineness of 2 microns, and the capacity is moderately low, an automatic filter is not justified. A permanent filter is not feasible because of the possibility of bacterial growth.

On the basis of the preceding facts, the following requirements for a filter were observed:

a. Low priced

b. Easily changed

c. Filter medium readily accessible.

d. Filter to a fineness of 2 microns (.0002 mm)

e. Two month life of filter medium

Discussion — Exploration for a filter finally simmered down to four brands that appeared to best represent their type of filter most characteristically:

Type A: Filteraid type that requires precoating

Type B: Single, slip-on filter

Type C: Felted asbestos, multiplate filter

The first part of this article appeared in the May 1952 issue, page 98.

Type D: Multi-tube, adsorption type

A summary of the filters and their characteristics is given in the table.

Conclusions—On the basis of a thorough investigation of all four filters, it is recommended that the Type B filter be given first consideration. This filter has the following advantages: 1. Largest filter area—46 sq ft; 2. Only one filter medium to change; 3. Lowest from the standpoint of price over a five year period, second lowest for ten years.

It can be seen from the preceding report that a thorough investigation and a detailed listing of the requirements and the logical filters, aided in the proper selection. This filter has now been in use since 1949, and management has had no cause to regret the selection.

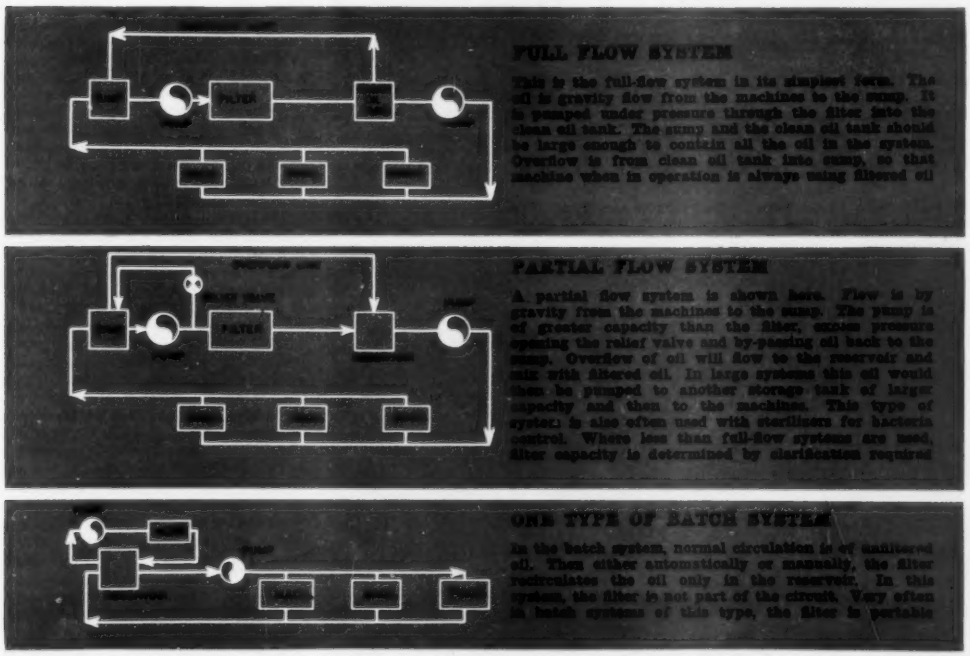
There is much more to reclaim systems than has been or can be touched on in this article since each individual installation could tell a different story. The economics of their use and the health consideration are of the most importance so were discussed here. Anyone who has had a proper installation and successful operation of a reclaim system would be able to go into great detail as to its many ramifications.

Perhaps as good a testimonial as any is the experience of a midwestern manufacturer who, after a thorough investigation, went wholeheartedly and whole-hog into the reclamation of not only his cutting and lubricating oils, but also solvents and other liquids used in metal working. Before salvage was put into effect, costs of these fluids approximated 2.5 per cent of the total productive labor cost.

With the salvage plant in full operation, this figure was reduced to less than 1 per cent. Total investment in reclaim equipment did not exceed $10,000, and the monthly operating costs were less than ten per cent of the total investment. With total usage of oil, solvents, and other metal working liquids exceeding 100,000 gallons a month, averaging in cost 25 cents a gallon, salvage ranged from 20 per cent to 90 per cent, depending on the nature of the fluid. This installation more than paid for itself every two months.

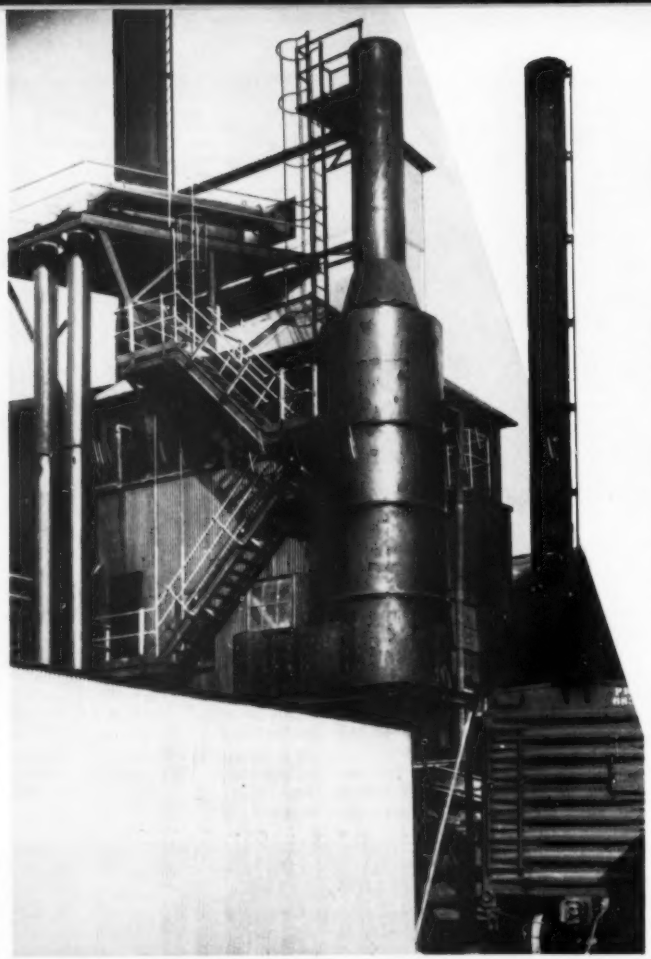
Table giving summary of characteristics of four types of filters included in study

ITEMS	TYPE A	TYPE B	TYPE C	TYPE D
Filter Area	**30 ft sq**	**46 ft sq**	**Adsorption**	**28 ft sq**
Type of Filter Medium	Filteraid	Slip-on felted mixture	Asbestos Tube	Felted Asbestos plate
Freq. of Filter Chg.	Daily	2 mos.	2 mos.	2 mos.
2 Mo. Cost of Filter Med.	$20.00	$15.00	$50.00	$6.00
Price of Filter	$385.00	$425.00	$491.00	$710.00
Over-all Size of Filter	57"x19" dia.	70"x18" dia.	41"x19" dia.	48"x14" dia.
Estimated 1 yr. cost, Inc. Filter	$505.00	$515.00	$791.00	$746.00
Estimated 5 yr. cost, Inc. Filter	$985.00	$875.00	$1991.00	$890.00
Estimated 10 yr. cost, Inc. Filter	$1585.00	$1325.00	$3491.00	$1070.00
Remarks	Requires back-flush	1 Filter Med. only	42 tubes	40 asb. plates


FULL FLOW SYSTEM
This is the full-flow system in its simplest form. The oil is gravity flow from the machines to the sump. It is pumped under pressure through the filter into the clean oil tank. The sump and the clean oil tank should be large enough to contain all the oil in the system. Overflow is from clean oil tank into sump, so that machine when in operation is always using filtered oil
PARTIAL FLOW SYSTEM
A partial flow system is shown here. Flow is by gravity from the machines to the sump. The pump is of greater capacity than the filter, excess pressure opening the relief valve and by-passing oil back to the sump. Overflow of oil will flow to the reservoir and mix with filtered oil. In large systems this oil would then be pumped to another storage tank of larger capacity and then to the machines. This type of system is also often used with sterilizers for bacteria control. Where less than full-flow systems are used, filter capacity is determined by clarification required
ONE TYPE OF BATCH SYSTEM
In the batch system, normal circulation is of unfiltered oil. Then either automatically or manually, the filter recirculates the oil only in the reservoir. In this system, the filter is not part of the circuit. Very often in batch systems of this type, the filter is portable

Dust Recovery

Company-engineered installation for recovery of zinc dust has returned an additional $6,000 per month resulting in amortization of equipment cost in one year . . . Additional 250 tons of zinc dust returned to smelters in same period



Housed on top of zinc dust hopper building are the twin cyclone collectors. The two vertical 20 in. diameter pipes, at left, conduct dust-laden air to the cyclones. At right corner of building is washer where finer dusts are caught by water sprays

Steam-blowing of galvanized pipe produces zinc dust. Dust is blown into the dust box where 12,000 cfm blower carries it through 20-in. pipe below floor level

A FIFTY PER CENT increase in zinc dust recovery in pipe galvanizing operations at the Etna, Pa., plant of Spang-Chalfant, division of The National Supply Company, returned the first six months of operation in 1951, an additional $6000 per month. This includes increased sales of dust and savings on labor and maintenance. Total cost of the new recovery equipment was amortized in less than a year. The improvement in working conditions in the galvanizing department was another important advantage of the high efficiency of the equipment.

As a conservation factor the equipment increased the supply of zinc dust and zinc cake to smelters during its first six months of operation by nearly 250 tons, which would yield close to 200 tons of zinc.

The collecting system receives zinc dust from two dust boxes near two galvanizing kettles. The dust is produced in blowing galvanized pipe with steam at 150 lb pressure to make a smooth coating. It is gathered into the dust boxes by suction of two 12,000-cfm exhaust blowers through two 20-in. OD pipes below the floor and blown into two 20-in. diameter standpipes.

The heavier particles are separated at the top of the standpipes by twin cyclone collectors approximately 55 ft above ground. The dust-laden air enters the collectors at the top and flows down the sides until reversed by a vortex plate.

Dust that is too fine to settle in the two cyclone collectors is carried down from the top of the collectors through a 36-in. duct and is blown by a 24,000 cfm blower at 4000 fpm into the bottom of a Ducon washer. This washer is a vertically mounted tank 7 ft in diameter and 18 ft high topped by a 16-ft stack. Centrifugal motion is induced by the air flow entering tangentially and the air mixes with descending water which removes some of the heavier particles.

The air continues to flow upward through a set of vanes which steps up velocity and centrifugal force. Dust particles are hurled into a sheet of

System Puts $36,000 in Till in 6 Months

water that descends along the inner wall of the washer. The air is then accelerated further by another set of vanes and more dust is removed in the same way.

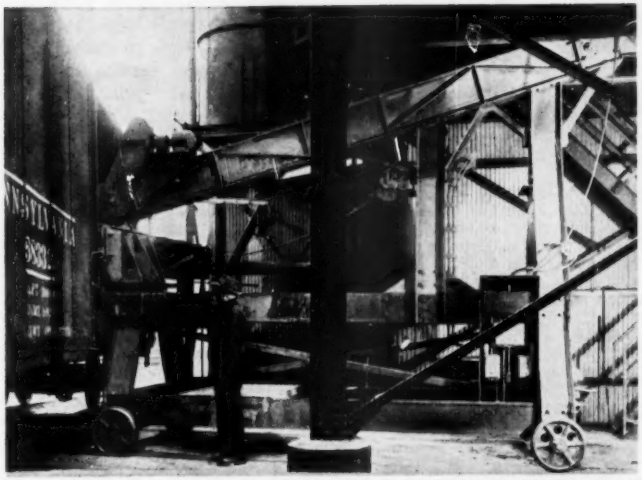
Particles of water are entrained with the air during this operation and the mixture of air and water passes through a third set of vanes which is above the point of water injection. After this final acceleration entrained water and zinc dust are expelled and the air flows along the inner wall and passes up through the stack.

The water with entrained zinc dust drains out the bottom of the washer by gravity to an open trough beside two settling basins into which it empties. These two basins, each of which is 15½ by 17½ ft in area, are used alternately. A motor-driven, 50-gpm pump picks up the overflow from the basins in a sump and recirculates the water through the Ducon washer for further removal of dust. This recirculation of water is one of the unusual features of the system. Make-up water is admitted to the sump by means of a float valve which maintains a constant water level.

When the level of settled zinc sludge nears the top of one basin, the flow is directed into the other basin. Zinc sludge in the first basin dries out and solidifies into zinc cake which is easily broken up and shoveled out. When enough has accumulated and dried it is picked up by a elamshell bucket in the yard and loaded in railroad cars for shipment.

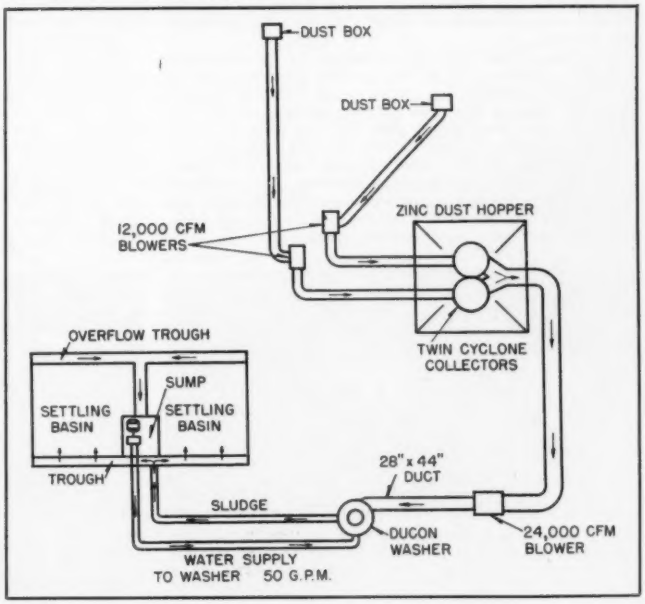
Zinc dust is transferred to a box car on a nearby siding direct from the hopper by means of a specially designed conveyor that is supported by a structural steel frame on wheels. This structure is approximately 19 ft long, 7 ft wide, and 15 ft high at the receiving end of the conveyor. It rests on tracks of 7½ ft gage which permit a 10-ft movement of the conveyor out from under the hopper to a point where it can reach any desired point inside of a box car on the adjoining siding.

Box cars can be loaded by a single workman. However, two usually perform the operation to assure speedy and efficient loading. The loading of 45 to 48 tons of zinc dust can be completed within one 8-hour day. This contrasts with former manual loading operations which required six to eight men two days, was highly disagreeable and shunned by the men because of the dusty atmosphere in which they worked.



Mobile-two-step conveyor was designed to deliver zinc dust from hopper to all parts of box car. Delivery belt unit can be swung 180 deg by chain sprockets and extended by rack and pinion from 8 to 16 ft from its centerline of rotation. Unit is then positioned manually by the use of 3 ft builders' wrenches

Zinc dust is collected in a hopper of 24-tons capacity located under twin cyclone separators. Zinc cake is collected alternately in twin setting basins after being entrained in water in the washer. Recirculation of water through washer and settling basins minimizes loss of dust that is carried by overflow into the sump



Check Points For Proper Coupling Alignment

Each type of coupling presents its own particular problem of line-up . . . This article explains line-up of two or more two-bearing machines . . . How to check for offset . . . How to connect machines with gear-type flexible couplings . . . With axial end float couplings

By J. W. SAMZELIUS, Motor Engineering Dept., Motor and Control Div., Westinghouse Electric Corp.

TO AVOID PREMATURE burnout in an MG set, it is important that the engineer be completely familiar with the types of couplings available and have a working knowledge of how they should be installed. This is true whether he is concerned with the couplings of complete machines or incomplete one-bearing units. The cause of a burnout often can be traced to improper selection or installation of the coupling.

Each type of coupling presents its own particular problem of alignment. It is important, therefore, to check the features of each coupling to see that you are getting the most efficient output with the least possibility of breakdown.

Point 1. Line-Up of Two-Bearing Machines

Flexible couplings should be used for all applications having each shaft supported by two bearings. In any application, each unit should be spaced correctly in relation to other units so that possible thrust is taken by the proper bearing. Also, each shaft should have freedom to expand as temperature increases. Correct placement depends on such factors as end play, type of bearings, type of coupling and, sometimes, on shaft expansion.

It is customary to make the largest machine—the one having the greatest shaft height—the starting point for the line-up.

As it may be assumed that the largest machine has most end play, the bearings of the smaller machines should be protected against its thrust forces. This is usually done by placing the next largest machine at such a distance from the largest that the end play of these two machines in a combination becomes less than the end play of the smallest machine. Fig. 1 shows schematically the proper relationships between the machines in a set for protection of the smaller bearings. Although sleeve bearings are shown on the drawing, small ball-bearings may also need similar protection.

In MG sets mounted on mobile sub-structures such as shovels, cranes, trucks or marine applications, axial thrust forces can become quite large, therefore special care must be used to obtain proper placement of the machines comprising the set.

In applications using resilient member couplings, it is not necessary to check the trueness of either the coupling face or the coupling rim after the coupling halves are mounted on respective shafts. Correct alignment of the shafts is all that matters and this can be accomplished and checked regardless of the condition of the coupling.

Point 2. Alignment of Shafts

The two shafts are first made parallel in both the vertical and the horizontal planes. Then their centers are made to coincide by keeping one machine fixed while the other is moved parallel to itself up or down and sideways until the line-up is complete.

The basic unit is first bolted down and checked carefully for parallelism with the bedplate. (If the bedplate is checked with the level, the level can also be used on the shaft.) The next machine is then placed in its approximate position and lined up to the first machine as close as measurements and checking with the level permit. Also, the mounting bolts are pulled up tight before checking of the alignment is made.

An indicator is then clamped to the coupling of the basic unit with the indicator plunger contacting the side of the other half, near the outer rim, Fig. 2. The two rotors should be moved axially, either toward each other or apart as far as the end play permits and should be kept in this relation during the line-up. The first indicator reading is made with the indicator at the top of the coupling. The exact spot of indicator contact with the second coupling half is marked and both rotors are turned 180 deg for a second reading at the bottom of the coupling. Make sure the indicator is contacting the same spot at both readings.

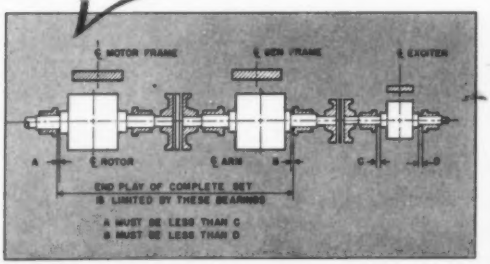


Fig. 1. This sketch shows the proper relationship between machines in a set for protection of the smaller bearings against thrust. Although sleeve bearings are shown, small ball-bearings may also need a similar degree of protection

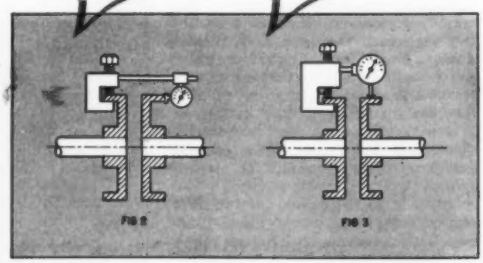


Fig. 2. The aligning indicator is clamped to the coupling of the basic unit with the indicator plunger against the side of the other half, near the outer rim. Fig. 3. Indicator is clamped so plunger moves radially against the second half

A difference in the reading indicates that the two shafts are out of line in the vertical plane. If the difference is greater than 0.002 in., the second motor must be raised at whichever end it is low.

After obtaining the specified agreement between the top and bottom readings with all mounting bolts tight, similar readings are taken at both sides on the horizontal centerline. Again, the same spot on the coupling should be checked at both readings, and the shafts should not move axially while turning the rotors from one position to the other.

Any correction in the angularity is made by loosening the bolts of the second unit slightly and bumping either end sideways, preferably in the direction which tends to line up the two machines to the same center. When the variation in the two readings is less than 0.002 in., the machines are considered parallel. The next step is to bring them on the same center.

Point 3. Placing on Same Center

For this check, the indicator is clamped so that the indicator plunger moves radially against the second coupling, see Fig. 3. The first reading is made with the indicator on the top and the spot for contact with the second coupling carefully marked. When turning both rotors over 180 deg, a difference in reading represents double the correction in height which must be made on the second machine. If the amount equals the thickness of available shim material, it is easy to attain alignment by adding equal shims under all feet. If the amount is less than available shim material, shims under two feet on the same side will raise the shaft approximately half as much as the shim thickness. The total difference in the reading must not exceed 0.002 in., which means that the shaft centers are not offset more than 0.001 in. in the final line-up.

Similarly, the check for offset in the horizontal plane is made by reading the indicator in both side positions with the indicator contacting the same spot. A difference in reading is corrected by bumping the second unit sideways, parallel to itself, until the reading shows less than 0.002-in. difference. As it is difficult to move the unit parallel to itself, particularly if the amount of movement is large, it may be helpful to arrange temporary stops which limit the frame travel to the desired position. Otherwise the angularity check may have to be repeated.

If the line-up just described is made in the field as a complete re-check of an existing four-bearing, two-unit MG set, the basic machine should be located in its original position by using the original dowel holes and pins. If it is necessary to move the second machine to obtain a correct line-up, the holes for the mounting bolts may have to be enlarged.

After alignment is assured, the mounting bolts are pulled tight and the set is given a test run to check that the line-up gives satisfactory performance.

Only after the test run shows that the line-up is satisfactory are the old dowel holes in the second machine re-drilled and reamed for new oversize dowels, to anchor the machine in place.

If the line-up concerns new machines on a new bedplate, all of the units are held only by the mounting bolts until the test run has been made. Dowels of appropriate size are then fitted on two feet of each machine.

In applications of gear-type flexible couplings, the procedure for line-up can be the same as recommended for any flexible coupling. The construction of this coupling, however, makes the coupling hubs rather inaccessible for clamping and reading of the indicator. Therefore, the following procedure, which is similar to the method recommended for solid couplings, can be followed:

The first step is to make sure each coupling hub runs true with its shaft both on the face and on the side of the machined flange. If the total runout is more than 0.0005 in., it can be assumed that the hub is not seated properly on the shaft and a correction must be made. A high key or a rough spot may prevent the coupling from seating properly or, in the case of a taper fit, the tapers may not mate close enough.

With true running hubs, angular line-up is attained by adjusting the second machine until the space between the face of the two coupling hubs is uniform and within 0.002 in. as measured with feeler gages or a suitable taper gage. The two rotors should be separated to the full extent of their end play during this check so that there can be no change in the space being checked. After angular line-up is obtained, the second machine is moved up or down by inserting or removing equal numbers of shims under each foot, and sideways by bumping until the centerline of the two shafts coincide.

A short straight edge that lies flat over the rims of the two hubs is a good indicator of the line-up. Pressing the straight edge against the rim of one hub while sliding it lengthwise over to the other hub in 4 positions 90 deg apart will show if there is any difference in the level. Permissible offset is less than 0.002 in. and can be measured by a feeler gage under the straight edge.

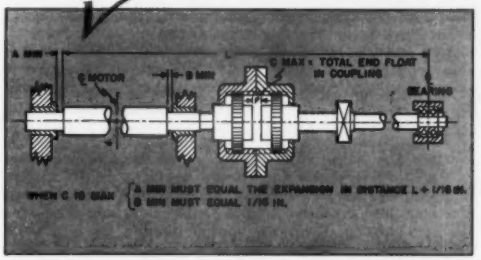

A MIN
C MOTOR
B MIN
C MAX = TOTAL END FLOAT IN COUPLING
BEARING
WHEN C IS MAX
A MIN MUST EQUAL THE EXPANSION IN DISTANCE L + 1/16 IN.
B MIN MUST EQUAL 1/16 IN.

Fig. 4. This sketch shows the relative position of motor bearings and shaft for protection of bearings against thrust

Axial end float, which is a characteristic of most spline couplings and is plainly a feature in the pin-type coupling, can create a situation in which the bearings of the motor may be heavily loaded by thrust. (Usually only sleeve-bearing machines need to be considered in these applications, but any bearing of little or no thrust capacity is equally vulnerable.)

This type of coupling permits the connected rotors to shift their relative position from time to time inside the limits of the end float in the coupling. If such a shift can reduce the clearance between the thrust shoulders of the motor shaft and the bearings to zero or near zero in either direction, the stage is set for trouble from thrust load. A shift in position, which can be caused by external axial forces during standstill, or axial components of the magnetic field at start, or even by creep during operation, is a possibility that should be recognized.

Friction between the splines while the coupling is transmitting torque can also transmit axial force. Such force, which can come from the driven machine or be due to shaft expansion in combination with the reaction offered by friction in the spline coupling, is responsible for imposing thrust load on the motor bearings.

Point 4. Protecting Bearings Against Thrust

Two main classes of applications for protecting bearings against thrust are considered:

1. *Driven shaft locked axially by a locked thrust bearing*—In this case no thrust can be transmitted to the motor from the load. If the locked thrust bearing is on the side away from the motor, expansion due to heat in the driven shaft must be added to a similar expansion in the motor shaft, and this total expansion must be provided for by the clearance between the outboard bearing and the thrust shoulder of the shaft.

The amount of expansion must be calculated from the distances involved and the temperature attained.

A rough estimate is to allow 0.005 in. for every 12 in. of shaft and every 100 F increase in temperature.

Figure 4 shows schematically the relative position of the motor bearings and shaft for sure protection of the bearings against thrust. Dimension C which represents total end play in the coupling, must be measured in each coupling.

2. *Driven shaft free to move axially with reversing thrust*—If the driven shaft is subject to reversing thrust and the shaft is free to move axially due to the thrust force, the combination of float in the coupling and float in the driven shaft makes it difficult to protect both motor bearings from all external thrust.

If the thrust bearing(s) for the driven shaft is subject to wear, which permits the axial movement to increase with time, it is necessary to evaluate this wear because it will increase the original float in the shaft.

Point 5. When End Play Is Maximum

Referring to Fig. 5, the clearance A in the motor must be increased from its corresponding value in Fig. 4 by the amount of movement permitted in the thrust bearing, including wear. Dimension B must also be increased, and this increase must, because of the reversing thrust, include all float in the coupling as well as the float of the shaft. Figures 5 and 6 show the extreme conditions which may develop under the conditions given. Dimension T is the float in the thrust bearing including possible wear.

As Fig. 5 and 6 show, the end float of the coupling is responsible for a substantial part of the clearance required for the protection of the bearings in the motor. The end float in the conventional coupling often exceeds the end play provided in the motor and, therefore, the motor bearings obviously can be loaded by all thrust transmitted by the coupling.

Point 6. When End Play Is Zero

As the motor for practical considerations must have limited end play, (commutators, collectors and ventilating ducts may require close limitation of the end play, but even blower clearance and striking distance limits the end play which can be allowed), the only answer in many installations is to limit the end play in the coupling itself.

Some manufacturers of couplings will furnish limited end float couplings with very little end play. In other cases the end float can be limited by installing a spherical button in the end of one or both shafts inside the coupling. The height of such buttons must not force the gears to bind against the ends of the housing, but a substantial part of the end float can safely be eliminated in this way.

In a multiple-unit solid-coupling MG set, one unit, usually the motor (also the largest machine), is complete with two bearings while all the other machines are made with one bearing each. The rotors of the single bearing machines must be supported by the stator bore during the assembly operations. To facilitate the line-up and at the same time protect the bearing and the rotor, it is recommended that a piece of cardboard or folded paper, equalling the space of the single airgap, be inserted in the airgap for the support.

The solid coupling must be machined correctly and true and is therefore checked with an indicator for trueness on the shaft, both over the face and for concentricity of the male and female spigot fit. The coupling half that is mounted on the shaft of the two-bearing machine can be indicated by rotating the shaft in its bearing. The other half, mounted on the shaft having only one bearing, must be checked between the centers of a lathe.

In these checks the indicator needle should not register any variation around the coupling, even one or two thousands runout of the face justifies taking a skim cut over the face. Of course, the spigot fit cannot be trued up and still maintain a fit, therefore the coupling may have to be discarded if the indicator shows appreciable eccentricity of the spigot. A small amount of eccentricity can be corrected by peening and re-machining.

If the coupling halves are true, all checks for angular alignment between the shafts are made by feeler gages between the coupling faces. The spigot fit will line up the centers automatically, making all checks for offset unnecessary.

The two-bearing machine is first bolted securely to the bed-plate. The next machine is then placed in its approximate position and the spigot fit partly engaged. A preliminary check of the gap uniformity, both between the coupling and of the airgap at the open end of the single bearing machine, will assist in selecting the shims required for obtaining proper height and correct positioning of the machine. When satisfied that the second unit is reasonably close to its correct position, the rotors are separated at the coupling and the mounting bolts in the feet are drawn tight.

The spigot fit of the coupling must now register to engage readily. If not, further adjustments in height by shimming or sideways by bumping must be made until there is no interference against entry in the spigot fit. The coupling is first bolted with only two diametrically opposite bolts. These are not drawn tight, so that an open space of approximately 0.010 in. or 0.020 in. is left between the coupling faces. This space is checked with feeler gages at opposite points at top and bottom and at both sides.

For satisfactory line-up the variation in space must not be more than 0.002 in. at two opposite points. Adjustment is made by raising or lowering the bearing end of the one-bearing machine and/or by bumping the same end sideways. When the desired alignment has been obtained, the coupling is bolted tight with bolts all around.

The airgap between stator and rotor at the open end of the single-bearing machine is next checked for uniformity. In a d-c machine the variation in airgap can be greater than in the smaller airgap a-c machine. In the former, ± 0.010 in. deviation can be permitted, while in the latter the minimum airgap at the open end

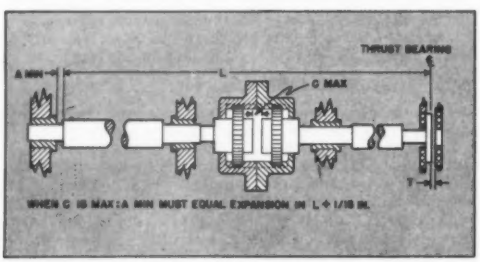


Fig. 5. When the end play is maximum, the clearance in motor must be increased from corresponding value in Fig. 4 by movement permitted in the thrust bearing, including wear

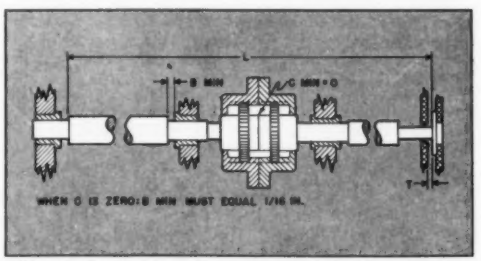


Fig. 6. When the end play is zero, Dimension B must be increased, and because of the reversing thrust, this increase must include all float in coupling as well as float of shaft

must not be less than 70 per cent of tne normal airgap.

In an MG set consisting of one two-bearing machine and any number of single-bearing machines, the end play of the entire set must be considerably less than the end play of the two-bearing machine. Limitations in commutator face-length and brush rigging in the smaller d-c machines are definite reasons for limiting the end play. Proper line-up of ventilating ducts in rotors and stators may restrict the end play in other machines.

To avoid interference by the internal parts as mentioned, it is best to restrict the end play between one of the bearings in the two-bearing machine and the largest single-bearing machine in the set. This can be made by a similar arrangement as shown in Fig. 1, except that the end play is governed by the above considerations and not by the end play in the smallest machine.

When installing an MG set the first time, much time and expense may be saved by test running the set as received. For such a test running, the set is placed on its foundation and filler shims are inserted between the bedplate and foundation at any holding-down bolt where an open space indicates a shim is needed.

A check of the effort needed to turn the rotors over by hand should now be made and if there is no undue binding the set is started under power. If the set runs smoothly, the holding down bolts are tightened while observing the performance of the set. If in tightening a certain bolt the vibration increases, additional shims should be tried until it can be tightened without making the vibration worse.

The set may then be shut down and a re-check of the starting effort by hand be made. If this effort is no greater than before, the set should be given a longer run during which the temperature of the bearings are closely observed. If any bearing shows appreciably higher temperature than the rest, it may be necessary to break the couplings and re-align the machines. Such re-aligning should always be made with the bedplate tightly bolted to the foundation. If the bearings show uniform temperature rise, the set can be assumed to be in alignment and the expense of checking alignment has been saved.

This typical motor generator set equipped with flexible coupling is used for power supply of a log-carriage drive motor

Care and Maintenance of Cast Iron Flanged Joints

Suggested hints for satisfactory flange assemblies: . . . Mating flanges should be in correct alignment . . . Imperative that contact surfaces are protected at time of installation . . . Types of bolts recommended

By FRANK PTACEK, Engineer, Yarnall-Waring Co.

IN COLD WEATHER, it is particularly important to see that no strains are set up when bolting cast iron fittings or valves in a pipe line. Cast iron is a brittle material and it therefore will not stand any of the "stretching" permissible with steel fittings or valves. In using cast iron, a little care in handling may save a lot of trouble and expense.

Contact surfaces should be protected at time of installation, to preserve the finish. If the finish is marred, it may result in a poor joint, regardless of care used in the remainder of the assembly.

Gaskets are usually of some grade of asbestos considered adequate for steam, water and oil up to 750 F. Dimensions should be in accordance with ASA standards for the particular pressure class—125 or 250 psi.

Ordinary carbon steel bolts are suitable for use with cast iron flanges, where their relatively low tensile strength affords some protection against overstress and consequent breakage. Note, however, the Code for Pressure Piping recommends that alloy bolt studs be used with steel flanges for pressures over 160 psi and/or temperatures over 450 F.

The distance between flanges which are to mate with the fitting to be assembled in the line should be essentially the same as the face to face of the fitting to minimize the loading on bolts and flanges. Mating flanges should be in correct alignment to assure uniform loading of the gasket

In pulling up on bolts, the best method is to have two men pulling up together and evenly on opposite bolts. After the bolts have been partly tightened to start gasket compression, then each pair of bolts should be normally tightened, bearing in mind that even with bending and temperature changes, the required minimum residual gasket compression is only 4 to 6 times the working pressure.

Bolting a steel lapped flange against a 125 psi cast iron flange or flanged fitting is not recommended, as there is danger of cracking the cast iron flange. Bolting a steel lapped flange against a 250 psi cast iron flange or flanged fitting is not recommended but is permitted by the Code for Pressure Piping, provided the lap is extended to the inner edge of the bolt holes and carbon steel bolts are used. For satisfactory results where a cast iron flange is bolted to a steel flange, it is desirable to use a flat faced steel flange and a full face gasket.

Considerable attention has been given to the design of flanges for low and medium pressure work in an effort to produce flanges that are amply safe and economically proportioned. Satisfactory designs for cast iron flanges have been evolved through long experience backed by computations and tests for 25, 125, 250, and 800 psi service at temperatures not exceeding about 450 F.

These hints should help you to make satisfactory flange assemblies and eliminate flange breakage.

IT USED TO GO DOWN THE DRAIN, BUT NOW

They Have Cut Water Use 90 per cent

One major change and several minor ones have helped Armstrong Cork's Dallas, Texas, plant to cut water costs by a terrific amount . . . Automatic control system for water circulation and a cooling tower are items contributing most heavily to the success of this new system

By E. P. DAVIDSON, Plant Engineer, Armstrong Cork Co., Dallas

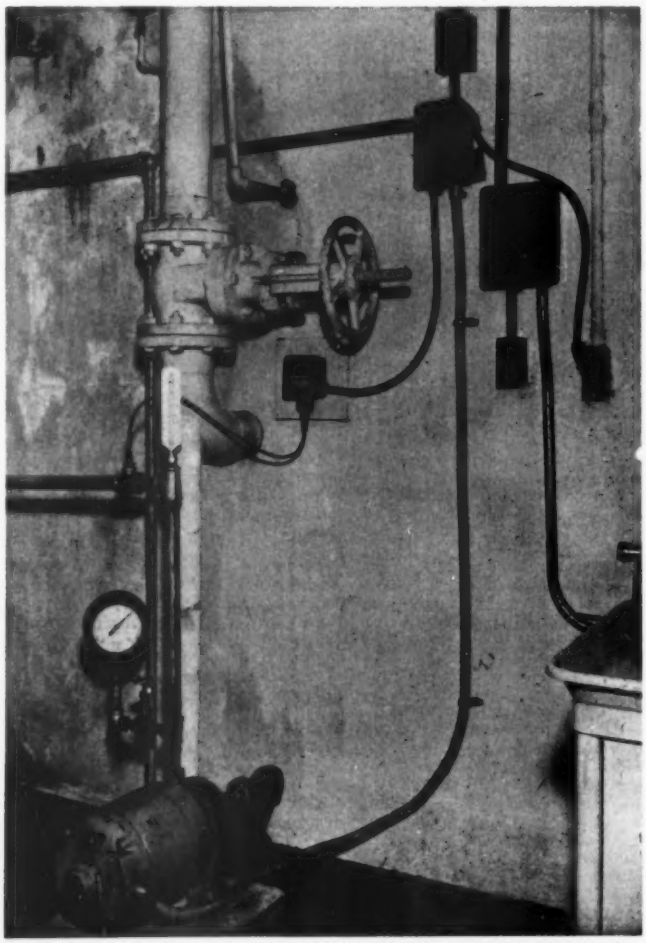


Photo above shows the control group for the automatic regulation of water flow

IT IS RATHER STARTLING to discover that you are pouring money down the drain—and it was indirectly money, although officially referred to in the expense ledger as "water consumption."

Here is the brief story of how such a discovery led to the installation of simple devices which immediately reduced water consumption 90 per cent; yet the capital cost was so modest that we estimated this expenditure would be completely repaid in less than one year through the cost savings to be realized.

This is a relatively young plant, having started production in 1948. From the very beginning we were aware of an important fact which can undoubtedly be applied to almost any type of manufacturing operation—that the supplying of utility services to an operation can be a major factor in over-all operating expense. It did, however, take us several months to gather sufficient factual data to determine that the water consumption figures were "out of line."

Our subsequent investigation led to one major and two minor sources of uncontrolled water consumption. This major source was our central air compressor, which supplied air to the entire plant, and which was water-cooled. The cooling water was being supplied directly from city mains, through manually operated valves, and after passing through the compressor head and aftercooler, was discharged into the sewer drain. The flow depended solely upon the extent to which the valves were opened; and we further discovered that sometimes the valves were not closed at all over weekends and during non-operating periods.

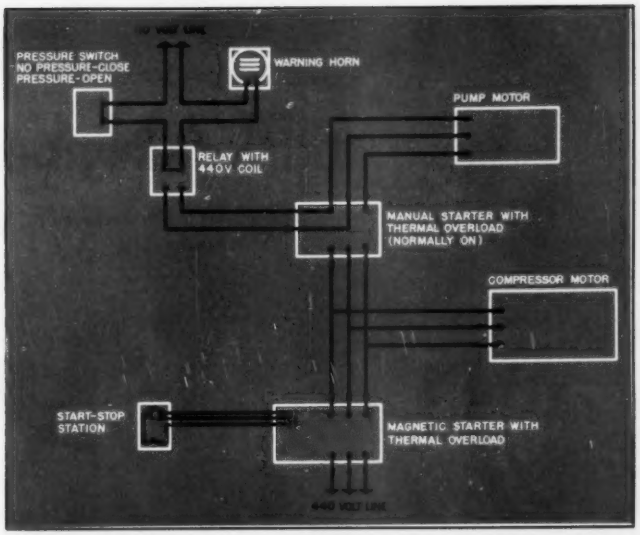
It was here that we began our water saving project, with the task of devising a system which would not only cool and re-use this water, but also one which would be completely automatic—and as foolproof as we could make it.

Outside the main plant building, but adjacent to the air compressor room, we constructed a concrete reservoir, complete with an automatic float control on the city water make-up line to maintain a constant water level. On top of the reservoir we installed a spray-type water cooling tower, so that all of the water which passed down the tower would re-

turn to the reservoir. A pump supply line was installed about 3 in. from the bottom of the reservoir to allow for settling of silt, and this line led to an electric motor-pump which was placed inside the building near the compressor. Piping then carried the water from the discharge side of the pump to the aftercooler, after which it was delivered to the compressor head. A return line from the compressor led back to the cooling tower atop the reservoir.

The mild winters of Texas reduced considerably the dangers of freezing on the water tower. However, to insure maximum utilization of this system even during cold weather, we installed a by-pass line which would permit the return from the compressor to go into the cooling tower or be diverted directly into the reservoir without passing through the tower. Giving thought to the necessity of permitting continued operation of the compressor in event of failure of the motor-pump or some similar emergency, we designed the piping arrangement so that the recirculating system could be isolated, and the compressor and aftercooler switched directly to city water for cooling.

In order to facilitate control of the system, we installed a pressure gage on the pump discharge side, plus flow indicators and thermometers on both the inlet and outlet sides of the compressor head. Thus we could not only see that cooling water was being supplied through the unit, but we could also determine the temperature rise of the water as it passed through the head.



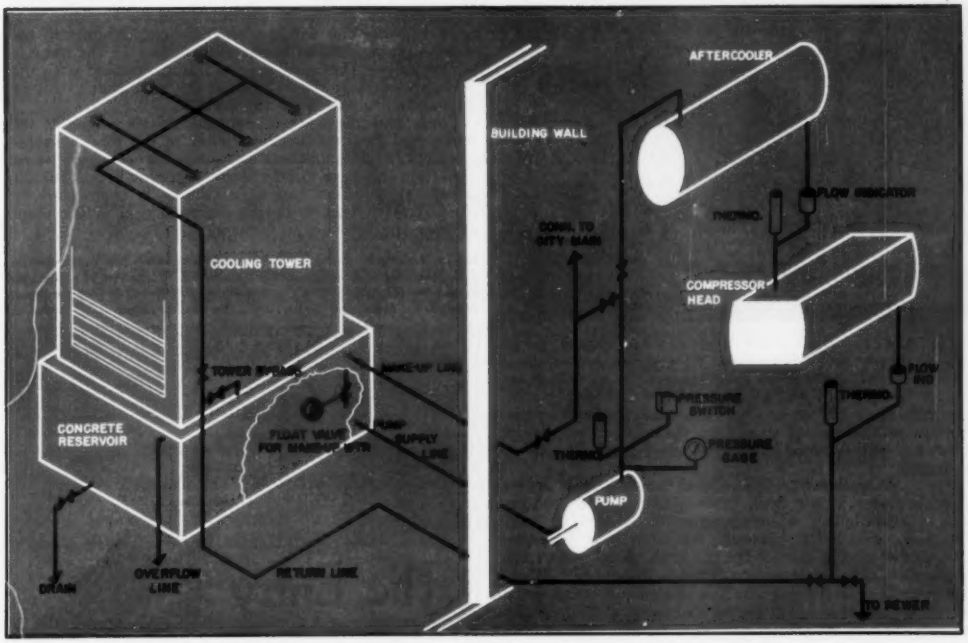
Schematic wiring diagram of controls designed to assure safety to equipment

With the circulating system complete, we set about to provide automatic controls which would assure operation of the motor-pump whenever the compressor was in operation. To accomplish this, we connected an electrical relay across the load side of the compressor's magnetic starter, permitting this relay to operate the starting coil located in the magnetic starter which controlled the motor-pump.

Our final step was to provide an alarm system which would indicate

(Continued on page 157)

Diagrammatic drawing of the cooling water system hook-up and the control lines responsible for the 90 per cent saving



PLANgineering Contest

The Judges

These plant engineers, members of the Plant Engineers Society of Chicago, judged entries in the June PLANgineering Contest. Left to right: Ted Ramond, Goodman Mfg. Co.; John Haugan, Union Special Machine Co.; Don Brown, Corn Products Refining Co.

The Winner

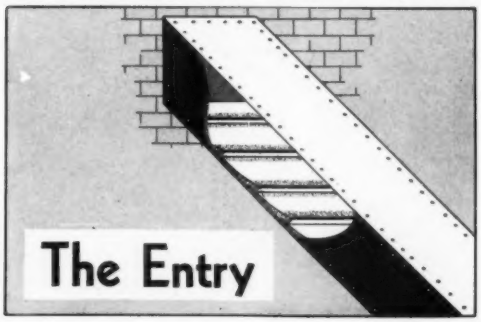
SIMPLICITY, cost reduction, and universal application proved to be the selling points of the winning entry submitted by James McCulloch. His cost-cutting idea required only the welding of angle iron lengths to the bottom plates of a bulk materials chute. In the opinion of the judges, this ease of installation, coupled with the widespread usage possibilities of the installation, was an outstanding attribute of the entry.

These features were recognized by the judges as the basic qualifications for the winner in the PLANgineering Contest. The maximum of maintenance or operating value (in this case maintenance is predominant) for the minimum of effort and expenditure, is considered by the contest judges to be the ultimate goal of the plant engineering function in industry.

James McCulloch, General Foreman, Maintenance, The Carborundum Co., receiving first prize check from H. E. B. Anderson, Associate Editor, PLANT ENGINEERING. Russell G. Albertson, Works Manager, Bonded Products and Grain Div., The Carborundum Co., looks on

ABRASIVE-CARRYING steel chutes, installed at angles from 45 degrees to 70 degrees, are exposed to constant abrasive action, and have a life span dependent on the amount and hardness of the material flowing through them. Most of this wear takes place on the bottom of the chute; therefore, quite often while the sides are still in good condition, the bottom has to be replaced.

This situation can be eliminated by installing angles perpendicular to the flow, in the bottom of the chute. These angles dam sufficient material to form a wear bed over which the material flows without touching the bottom of the chute. By the time these angles are worn down, the wear on the sides of the chute will require their replacement, and the chutes can be renewed by installing side wear plates and new angles on the bottom plate of the chute.



The Entry

Judges Select June Winners

First Prize ..... **$100.00** ..... **James McCulloch**
General Foreman-Maintenance, The Carborundum Co., Niagara Falls, N. Y.

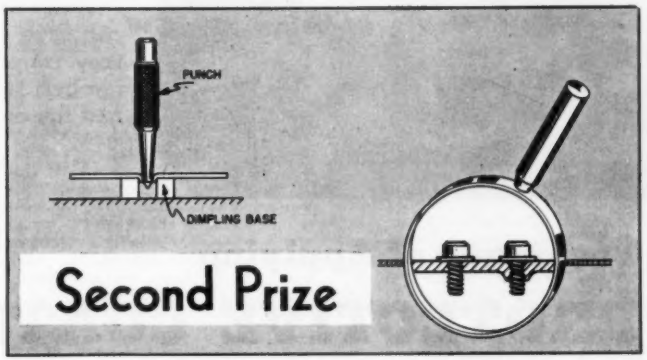
Second Prize ..... **$ 50.00** ..... **Sidney V. Worth**
Mechanical Engineer, Lever Brothers Co., New York, N. Y.

Third Prize ..... **$ 25.00** ..... **Myron Bixler**
Plant Engineer, Dungan, Hood & Co., Philadelphia, Pa.

Fourth Prize ..... **$ 25.00** ..... **R. W. Hiller**
Plant Engineer, Dravo Corp., Neville Island, Pittsburgh, Pa.

ON OCCASIONS when it is necessary to drill and tap thin gauge metal, better results are obtained, threadwise, by first drilling an undersized hole, then dimpling the metal at the hole. The use of a standard center punch, driven through the hole in the metal into a circular die, causes a flow of metal into the die, to form a thread wall. The subsequent use of a tap in this formed thread wall produces a thread length approximately twice that of a tapping operation through the nominal thickness of the thin gauge sheet.

The additional thread length obtained by this method can be easily seen in the magnified drawing shown at right.



Please turn to page 50 for details of the entries submitted by the third and fourth prize winners. The third award describes a folding scaffold for painters; the fourth award mentions the method used for removing sections of concrete floor.

RULES OF CONTEST

1. Entries must not exceed 500 words in length.

2. Entries will be judged on basis of originality of idea, on how generally the idea may be applied to other plants, and on the time and money-saving possibilities inherent in the idea.

3. All entries, whether prize winners or not, will be paid for at regular rates if they are later published in PLANT ENGINEERING.

4. Deadline for entries in the August Contest is June 25th; entries received between June 25th and July 25th automatically enter the September contest; etc.

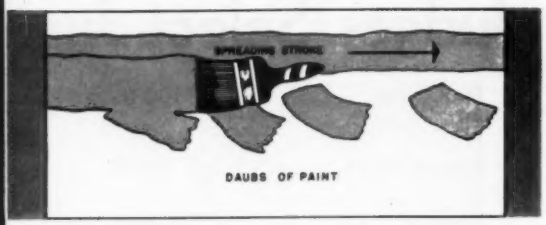
5. Final contest will be November unless notice is given to the contrary.

6. No consideration will be given to entries which have been published elsewhere.

7. Judges of the contest will be three members of the Plant Engineers Club of Chicago; their decision will be final.

8. Send entries to: Contest Editor, PLANT ENGINEERING, 110 So. Dearborn St., Chicago, 3, Ill.

Left: Applying aluminum paint to water tank, piping
Below: Fig. 1. Daub paint on surface before spreading



You can save money by using good coatings designed for the job . . . You can save even more by making sure they are properly applied in the manner best suited to their characteristics and the characteristics of the surface

Technique of Applying

PROTECTIVE COATINGS

YEAR AFTER YEAR, the use of paints and other protective coatings becomes more widespread in industry. This is due to an increasing appreciation of the benefits obtained in property protection, better appearance and improved employee morale.

A painting program, to be fully effective however, must integrate all phases of property surface protection and color harmony. The program should be under the direction of a painter thoroughly informed on available modern paints and associated materials, modern methods of paint application, and the employment of the modern science of color harmony. This is essential if best results are to be obtained, because the rapid strides that have been made and are being made in the formulation of paints require a constant and thorough knowledge of the subject if advantage is to be taken of every applicable modern technical advance.

In selecting paints for specific uses consideration should be given to a number of factors. For exterior use, different paints will be required depending upon whether they are to be applied to wood, metal, masonry, composition, etc. Conditions of temperature and atmospheric contamination must also be considered. And for interior use, paints may be required for such different surfaces as wood, metal, plaster, masonry, composition, etc. In addition, varnishes, shellacs, lacquers, sizings, primers, sealers and other associated materials are employed.

For exterior application, the ideal paint is one that forms a film hard enough to avoid chalking but soft enough to be elastic and avoid cracking and scaling. Between the two extremes chalking is less objectionable because the surface can be repainted without the necessity for scraping or burning. White lead paint is probably the best paint for use on exterior wood surfaces. This paint, of course, can be applied as white, or most any other color by the addition of suitable tinting colors. But since white lead paint has one weakness as white paint, that of being a little too soft and chalking or dusting after a couple of years, the addition of zinc oxide is required to increase the hardness of the film. In some localities, such as near the ocean, a larger percentage of zinc oxide is required. But too much oxide is required. But too much must be avoided as it will harden the paint film excessively and cause it to crack. However, zinc oxide should only be used in the finish coat, never in the priming or under coats, because the paint film will become too hard and brittle to expand and contract with the surface and will crack and scale off. The chalking of white lead paint is retarded, however, when it is used in tinted form.

Zinc oxide paint possesses the advantage of being resistant to atmospheric gases, but since it produces an excessively hard and brittle film, white lead or other pigments must be added to provide sufficient elasticity. Tinted zinc oxide paints are usually clearer and brighter than other types of tinted paints.

Titanium oxide when mixed with zinc oxide produces an excellent white paint that does not darken on exposure and is unaffected by gases.

Aluminum paint for wood is very satisfactory for exterior wood surfaces where a silvery finish can be

Fig. 2. After paint has been daubed at various points on surface it should be spread with long sweeping strokes

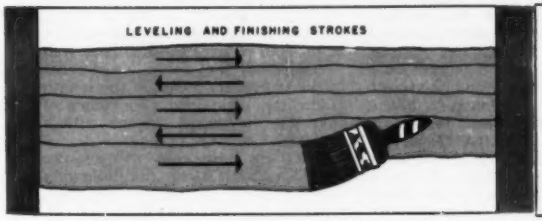
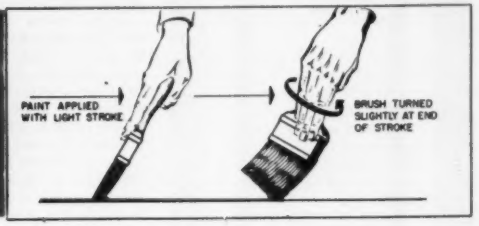


Fig. 3. In order to avoid leaving brush marks on the fresh surface, brush should be turned slightly at end of stroke



used. This paint is composed of minute flakes of aluminum in a liquid vehicle. When the paint is applied, these flakes arrange themselves in layers from five to ten flakes deep, with a varnish cement between each layer. This multiple layer provides great durability because it is entirely opaque and impervious to moisture. Its opacity protects the pain film itself from the injurious effects of sunlight on the varnish, while its moisture resistance protects the surface beneath the paint. This type of aluminum paint is rich in oil and provides an elastic and durable film. It can be used either as a primer or as a finish coat.

Aluminum paint is resistant to the corrosive action of common industrial gases and those of a number of chemicals. Its high degree of reflectivity reduces the transmission of the sun's heat and thus reduces interior temperatures of buildings.

Where exterior or interior metal or masonry surfaces, interior plaster, or composition roofs are to be painted, aluminum paint formulated for metal and masonry use imparts a durable, protective, waterproof finish, because it contains waterproofing resins and sufficient oil to give it good elasticity, and it dries to a hard finish. It protects the surface against moisture and rust formation and provides chemical resistance. This paint is suitable for first or finish coats.

Red lead is widely used as a first coat on metal surfaces. It is not suitable for finish coats, however, as the color fades, though its protective durability is not impaired by fading.

Graphite paint is also used for metal surface protection, such as on machinery, metal roofs and steel bridges, being very durable in this respect. It is dark black in color.

Asphalt type paint is frequently employed on the interior surfaces of steel water storage tanks as a protective coating. It produces a relatively smooth, black surface.

Where interior surfaces that reach temperatures of 600 to 800 F. require protection against oxidation, aluminum enamel can be used. This is a fast-drying paint having most of the oils replaced by heat-resisting resins. This enamel is very smooth and chrome-like and is ideal for decorative purposes.

Another aluminum paint is made with silicone resins and is able to resist temperatures to 1700 F. It fuses with the surface metal and forms a bright elastic finish that resists moisture, corrosion, industrial fumes, mild acids and alkalies.

Other masonry paints for use on interior or exterior surfaces other than floors include rubber-base masonry paint and oil-base masonry paint. These paints are formulated to provide greater resistance to the lime in concrete than ordinary paints provide.

For interior painting of walls and ceilings of plaster, wood or metal, various types of paints may be used. White lead paint is, of course, expensive and is usually used only for high grade work. Flat wall paint, generally consisting of zinc oxide and lithopone with other pigments (some paints contain titanium oxide) and an oil which dries flat, is used to a great extent. This type of paint dries without lustre and soils easily. Some brands can be washed satisfactorily while others cannot.

Another type of interior paints is known as mill whites. These are used extensively in large industrial buildings, and are waterproof and light reflective. They are made in full gloss, semi-gloss and flat finish; the gloss types are washable, while the flat types can be washed about as much as other flat wall paints.

Enamel or varnish is generally used on trim, and enamel is used where considerable moisture is present, as in shower rooms and lavatories, or anywhere else where an easily washed gloss surface is required.

Semi-gloss enamel is less glaring than enamel, yet wears well.

Before applying paint to any type of surface, new or old, the surface must be properly prepared if a long-

Painter preparing to apply second coat to interior tile wall surface with suction feed spray gun. Sectional view of this type of gun is shown in Fig. 6

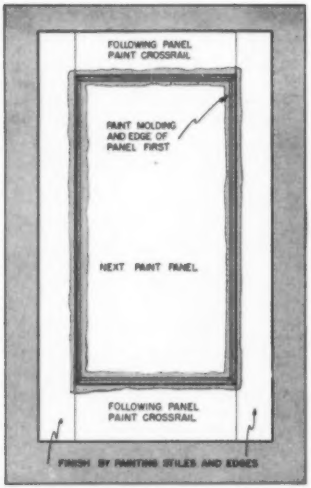


Fig. 4. Doors should be painted by doing the molding and panel edges before the panel; finish with rails, then stiles

lasting paint film is to be assured. On exterior surfaces, if the previous paint coat has merely chalked normally all that is required is dusting of the surface before applying the paint. Usually one paint coat will be sufficient on such a surface if the color is similar.

Where bare patches of wood show here and there, however, the surface should be wire-brushed to remove loose particles of paint pigment, then dusted. Two coats of paint will be required on a surface of this type.

If the old paint has blistered, peeled or is checked, the loose material should be removed by scraping and wire brushing. (A respirator should be worn when scraping, wire-brushing or sanding painted surfaces.) Deeply checked paint film should be sanded smooth or removed with paint remover. The edges of the old paint around the bare spots where blisters have occurred should be sanded smooth. If blistering and peeling are caused by moisture behind the wood, this condition must be corrected before repainting.

Minor repairs, such as reputtying window sash, calking around door and window frames, replacing loose nails, filling cracks, and replacing defective rain gutters and downspouts, should be completed. A good putty for filling cracks and nail holes consists of one part white lead in oil and two parts whiting, by volume, softened to a working consistency with japan oil. Bare wood should be primed before applying putty or crack filler, and exposed knots and resinous spots should be sealed with orange shellac.

In applying paint, it is usually best to start at the highest point and work downward. Broad surfaces may be painted with a 4 or 5 in. brush; doors and trim with a 3 in. brush; while a 1 in. sash brush should be used for window mutins and other very narrow surfaces. Always dust off the surface thoroughly just before applying paint.

Bare wood should be primed, given a coat of undercoater, and one or more finish coats. The use of undercoaters permits the finish coat to cover much more area. Each coat should be given at least 48 hours to dry before the following coat is applied; a week or even 10 days is better. Where aluminum paint is used as a primer on wood, at least a week should be allowed for the paint to set before applying the finish coat of aluminum or oil paint.

Undercoater and finishing paint should be mixed thoroughly and thinned in accordance with the manufacturer's instructions. A simple test will indicate the paint consistency. Let the paint run off the flat mixing paddle into the mixing container. If it drips slowly it is too thick and will drag under the brush. Proper brushing consistency paint will run off the paddle in a thin steady stream, finally breaking into a series of drops.

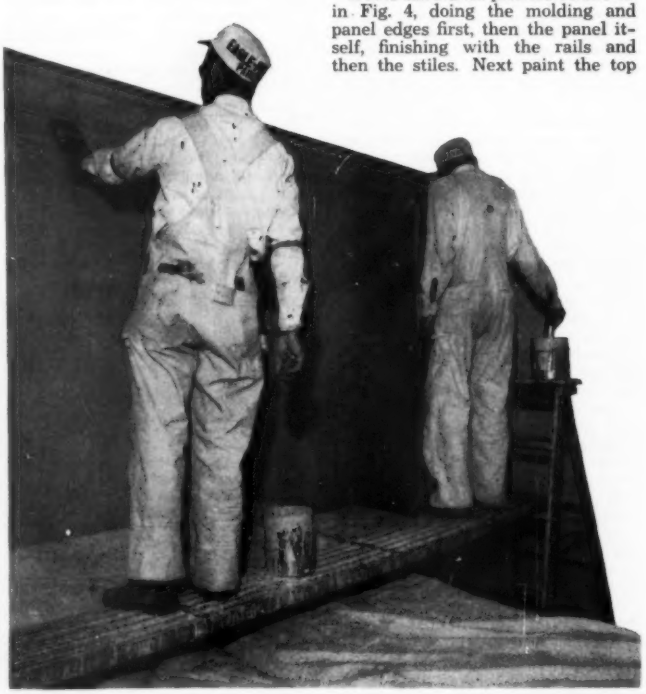
When applying paint with a brush, dip the bristles only about one-third their length, and slap them against the side of the pail to remove excess paint. Carry the paint to the work with the loaded brush bristles down, and apply the paint to the surface with a few daubs and spread it with right and left strokes, as shown in Fig. 1. Then brush it out to a uniform thickness with long sweeping strokes, as shown in Fig. 2, lifting the brush lightly from the surface at the end of each stroke. It is well to remember that the thinnest areas of the paint film measure the length of its life, hence the importance of covering the entire surface with a uniform thickness of paint.

The first paint coat will require more brushing than the following coat or coats. On old or absorbent surfaces the oils in the first coat will be absorbed more quickly. To overcome this condition, pick up less paint at each dip of the brush, and avoid building up the undercoater into a heavy, uneven coat which may wrinkle or break on drying.

Always keep the paint at proper consistency by occasional stirring, and by adding thinner, as required, to offset the effects of evaporation of the volatile oils.

In painting window sash, have the brush well loaded with paint, and paint the stiles and rails, then the frames and casings. On multiple pane sash, paint the muntins before the stiles and rails.

Doors should be painted as shown in Fig. 4, doing the molding and panel edges first, then the panel itself, finishing with the rails and then the stiles. Next paint the top



Applying a flat coat of interior paint to wall surfaces. Flat paints may be used for either priming coat or finish coat depending on type of service anticipated

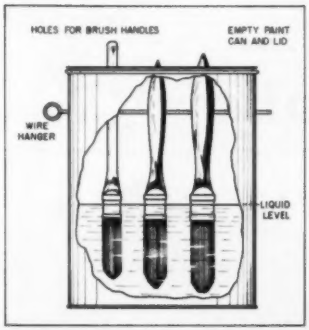


Fig. 5. For storage, suspend the brushes by the handles in a covered container holding both linseed oil and solvent

and bottom edges and, if the door swings out, paint the edge on the lock side the outside color.

If metal gutters and downspouts have previously been primed and painted and the paint is in good condition new paint coats may be applied directly. New galvanized gutters and downspouts should weather six months before being primed and painted. Where scale or rust is present, this should be removed by wire brushing; then the metal should be primed and painted.

In using aluminum paint, where the surface is weather-exposed steel, all dirt and grease should be removed with mineral spirits, and loose rust and scale with steel scrapers and wire scratch-brushes or by means of sandblasting. With the surface dry, a priming coat of red or blue lead, zinc chromate, or a similar good rust-inhibitive paint should be applied. After this has dried, one or two finish coats of aluminum metal and masonry paint may be applied.

If the surface is galvanized iron and has weathered for at least six months, clean thoroughly and apply a coat of zinc dust-zinc oxide primer, followed by a coat of aluminum metal and masonry paint, or eliminate the primer and apply one or two coats of the aluminum paint.

On new galvanized iron, treat the zinc surface chemically to provide good paint adhesion. The application of a priming coat of zinc dust-zinc oxide is beneficial before applying the aluminum paint.

One or two coats of aluminum metal and masonry paint may be applied directly to new tinplate exposed to the weather, after it has been washed with mineral spirits and allowed to dry. If the metal has rusted, scratch-brush it thoroughly, wash with mineral spirits, dry, apply rust-inhibitive primer, then one coat of the aluminum paint.

Concrete surfaces can be substantially protected with aluminum paint. The surface should age for at least four to six weeks or should be treated with a zinc sulfate solution to neutralize the free alkali in the cement. The concrete surface should be thoroughly scratch-brushed to remove loose material and dust, cracks and crevices should be patched and filled, neutralized, and allowed to dry thoroughly. Then one coat of aluminum metal and masonry paint should be applied as a primer and sealer. After at least 48 hours, a second coat of the aluminum paint should be applied to provide additional protection against weathering.

Exterior brick walls will transmit less heat from the sun if painted with aluminum paint. Old walls require only a cleaning with a stiff brush to remove all loose material before painting. New mortar joints require the same treatment as concrete walls.

Aluminum metal and masonry paint may be applied to composition roofs to extend their life. The only preparation required is a thorough cleaning, followed by the application of one or two coats, using a mop, brush or spray gun.

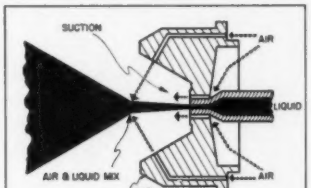


Fig. 6. In a suction feed gun, paint is drawn through a center orifice by the suction created at the gun's nozzle

Paint brushes should be cleaned immediately after using. Those used in paint may be cleaned with turpentine, though mild soapsuds are recommended for brushes employed with some of the rubber base paints. Varnish or enamel brushes also should be cleaned with turpentine, while wood alcohol is required for shellac brushes. Lacquer brushes should be cleaned with lacquer thinner. Submerge the brush and work the liquid thoroughly up into the bristles with the fingers, then shake the brush vigorously to remove dirty liquid and wash again in clean liquid. Straighten the bristles with a wire brush and lay the brush away flat, or suspend it by the handle in a covered container, as shown in Fig. 5, with enough linseed oil and solvent to cover the bristles. Always use separate brushes for painting, enameling, varnishing and lacquering.

Paint can be applied to exterior surfaces with a spray gun if conditions are favorable. The weather must be calm as any breeze will deflect the spray from the surface area being painted. Areas not to be painted should be masked, though surfaces such as window sash and trim are usually painted with a brush. Unless the job requires that the paint be thinned, it should be sprayed at can consistency.

In order to do satisfactory paint spraying it is necessary that the equipment be in proper operating condition and that the operator understand the fundamentals of the work.

Spray guns are of two general types, suction feed and pressure feed. As shown in Fig. 6, in the suction feed gun, paint is drawn through a center orifice by the suction created at the nozzle. Jets of air from horn holes on the cap produce a fan pattern as the air and paint mix outside the nozzle. This method is termed external mix.

The suction type gun will spray lacquer and light-bodied materials, but will not handle heavy paints and enamels.

In the pressure feed gun, Fig. 7, the paint is forced under pressure through the center orifice where it mixes with the air inside the cap and is expelled through the nozzle opening in a fan pattern. This method, called internal mix, permits heavy-bodied materials to be sprayed as well as any others used in brush painting, except fast-drying materials, such as lacquer. These latter dry inside and around the cap opening and cause clogging.

Internal mix is used only with pressure feed guns, but pressure feed guns can be either internal or external mix.

Industrial type spray guns usually spray at from 60 to 100 psi pressure. For small wall areas a container gun can be employed advantageously since it is easier to clean afterward, but for larger areas the paint tank is used with a containerless gun.

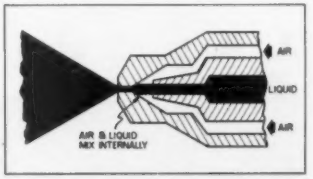


Fig. 7. In a pressure feed gun, paint is forced under pressure through the center orifice where it mixes with the air

For floor and ceiling painting an angle head can be used on a pressure feed gun. This eliminates the necessity of tilting the gun excessively. A round opening cap can also be used, to produce a round pattern, where required, instead of the conventional fan pattern.

Usually a paint spray pattern 10 to 12 in. wide is about the maximum used on wall surfaces. The ideal pattern is an even oval shape. Where the pattern sprayed shows too much paint deposit in the center, the cause

(Continued on page 152)

News of the P. E. Clubs

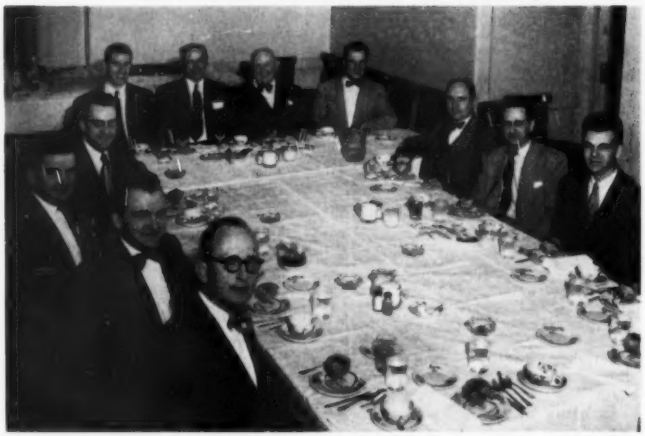
Baltimore's New Club Now Open for Business

ON APRIL 8, the inaugural meeting of the Plant Engineers' Club of Baltimore was held at the Hotel Stafford.

The Club's major objective was to permit the charter members to get acquainted and lay tentative plans for the organization's structure. The meeting, preceded by refreshments and a dinner, was attended by members of plant engineering departments from several of the city's leading plants.

Chairman of the meeting was A. D. Field, Plant Engineer, Bethlehem Sparrows Point Shipyard. Mr. Field appointed Loyal Titus, Carr-Lowrey Glass Co., and Jack Wolfe, Black & Decker Mfg. Co., a committee to investigate the by-laws of other clubs and to propose a set of by-laws for the Baltimore Club. These are to be acted upon by the membership at the next meeting to be held April 6.

Plant engineers in the Baltimore area who are interested in joining the club may get in touch with Mr. Field at Bethlehem Sparrows Point Shipyard located in Sparrows Point, Maryland.



Present at inaugural meeting of Baltimore Plant Engineer's Club, left to right: Wm. B. Hodges, Revere Copper & Brass Co.; Joseph McGuire, Bethlehem Sparrows Point Shipyard; Andrew McGuire, Bethlehem Steel, Key Highway plant; Stanley Boyce, Bethlehem Steel, Key Highway plant; John Cochrane, Revere Copper & Brass Co.; Fred Wilcox, Glenn L. Martin Co.; Loyal Titus, Carr-Lowrey Glass Co.; A. D. Field, Bethlehem Sparrows Point Shipyard; J. Walter Lautenberger, Davison Chemical Co.; Thomas E. Hanson, Plant Engineering magazine; and Jack Wolfe, Black & Decker Mfg. Co. Second meeting was held on April 6

A. B. Dick Has Open House for Chicago Club

Members of Plant Engineers Club of Chicago in attendance at Open House held by A. B. Dick Co., at its new plant

No. 1-B electric vibrating Feeder—for small-capacity operations up to 3500 pounds per hour. Ideal for laboratory use.

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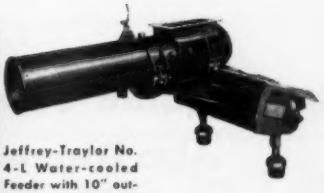
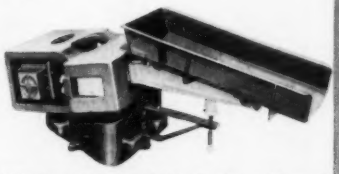
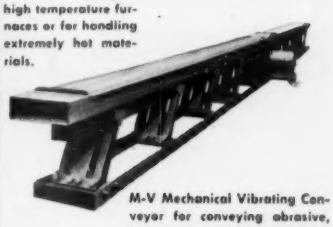


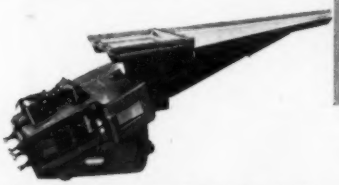
Jeffrey-Traylor No. 4-L Water-cooled Feeder with 10" outside diameter x 4' long water-jacketed deck. For feeding to high temperature furnaces or for handling extremely hot materials.



Jeffrey-Traylor No. 3 electric vibrating spark-proof Feeder with 12" x 30" open-pan deck. For feeding operations in hazardous atmospheres or under extreme moisture conditions.

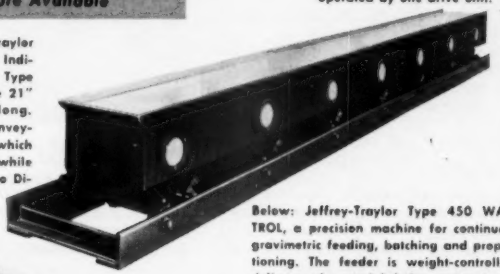


M-V Mechanical Vibrating Conveyor for conveying abrasive, lumpy or rough materials, hot or cold, dry or wet, as well as fine materials. Up to 80' can be operated by one drive unit.

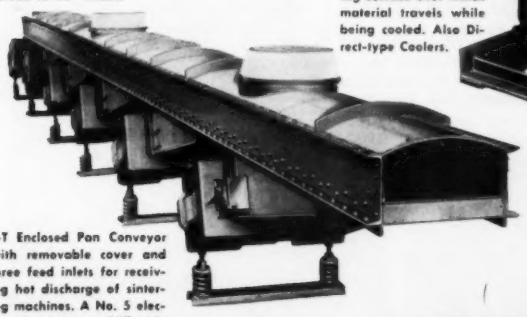


Jeffrey-Traylor electric vibrating Spreader Feeder, 14" wide x 70" long with one edge tapered to spread to 55" width.

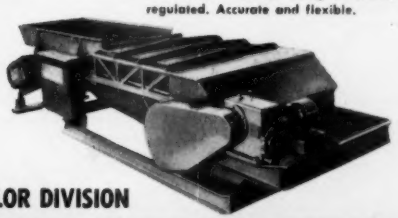
Right: Jeffrey-Traylor electric vibrating Indirect-type Cooler. Type HI-21F open type 21" wide and 18' long. Has solid plate conveying surface over which material travels while being cooled. Also Direct-type Coolers.



Below: Jeffrey-Traylor Type 450 WAY-TROL, a precision machine for continuous gravimetric feeding, batching and proportioning. The feeder is weight-controlled, delivery of material being automatcally regulated. Accurate and flexible.



J-T Enclosed Pan Conveyor with removable cover and three feed inlets for receiving hot discharge of sintering machines. A No. 5 electric vibrating type, 25" wide x 45' long.



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Boston Club Votes Change in By-Laws; Also Discusses Plant Engineering Magazine

THE PLANT ENGINEER'S CLUB (Boston) marked a significant change in its by-laws at the meeting held April 17. By a top-heavy vote the membership gave its approval by sealed ballot to a proposition to increase the number of elected members from 30 to 40, and of associate members from 20 to 25.

Speaker of the evening was E. W. Hopper, Chief Chemical Engineer, Crucible Steel Company of America. Mr. Hopper's talk was centered on stainless steel and problems which Crucible has encountered in applying the metal under various conditions of application and use. Grinding of stainless, and its use—particularly when welded—under stress, were two conditions under which extreme care in processing was required, said the speaker.

Subject for discussion at the April meeting was PLANT ENGINEERING, and how it can be of even greater use to the country's plant engineers. Tom Hanson, Editor, and Dick Fuller, District Manager, were on hand for the discussions. Several interesting suggestions were made by the members; these covered not only physical features of the magazine but also editorial policies, objectives and treatment. Several of these ideas will be acted upon in future.

It was announced at the meeting that the Annual Meeting and Outing would be held June 19 at the United Shoe Machinery Athletic Club.

At speakers' table, left to right: Richard Y. Fuller, District Manager, Plant Engineering magazine; Thomas E. Hanson, Editor, Plant Engineering magazine; Edward Benner (American Sugar Refining Co.) Vice-President, Plant Engineers' Club; E. W. Hopper, Chief Chemical Engineer, Crucible Steel Company; Leo Monty (Artisan Metal Products Co.) President; Byron Engelbach (New England Confectionery Co.) Secretary-Treasurer; Charles G. Montani (Robert Gair Co., Inc.) Chairman, Membership Committee. Mr. Hopper was speaker of the evening

Group photo of members and guests in attendance at regular monthly meeting (April) of Plant Engineers' Club (Boston)

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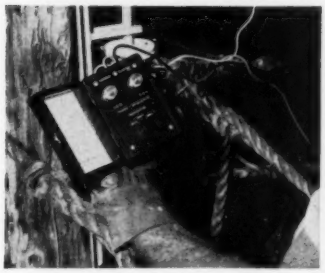

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Motor repair work simplified by three hook-on instruments

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AK-1 VOLT-AMMETER

Handy-portable instrument measures both volts and amperes over a range of 15-600 amperes, and 100-600 volts. It maintains an accuracy of ±3 per cent full scale. It's used primarily for motor checks of polyphase circuits. Price—$76.77*.

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The AK-2 measures a-c power easily. Both single and polyphase circuits can be analyzed; in addition to kilowatts it will measure vars in balanced three-phase circuits. It will measure up to 300 KW, 15-600 amperes, and 100-600 volts with a full-scale accuracy of ±5 per cent. Price—$87.00*.

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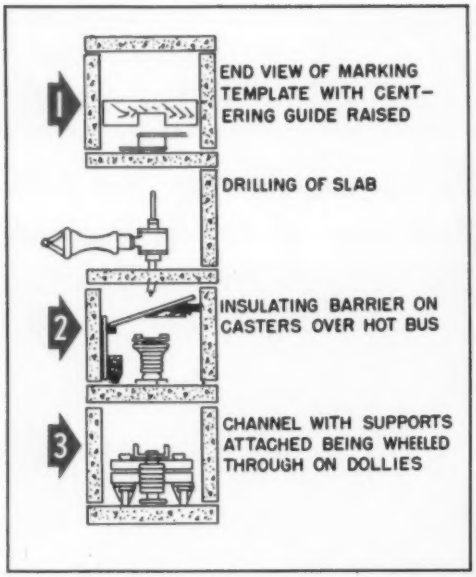

1
END VIEW OF MARKING TEMPLATE WITH CENTERING GUIDE RAISED
DRILLING OF SLAB
2
INSULATING BARRIER ON CASTERS OVER HOT BUS
3
CHANNEL WITH SUPPORTS ATTACHED BEING WHEELED THROUGH ON DOLLIES

Partial cross-section of six-high bus cubicles illustrates compartmented construction and three phases of bus replacement

New Bus Bars for Old—A PLANNED Change

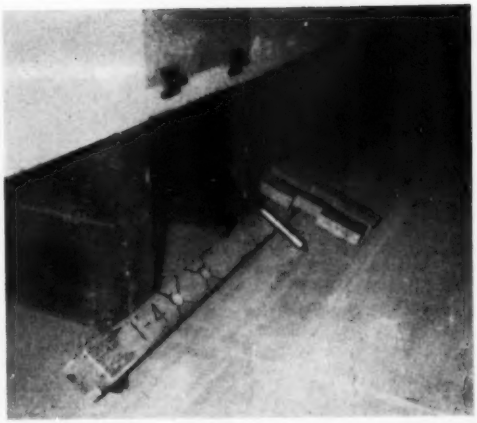
By RAY BUCHAN

THE REPLACEMENT of some 2200 feet of flat bar copper bus with copper channel, in a bus enclosure of pre-cast concrete, with the system partially energized, posed the problem. Planning, and the use of ingenious jigs and dollies, provided the answer for safe, fast completion of the work.

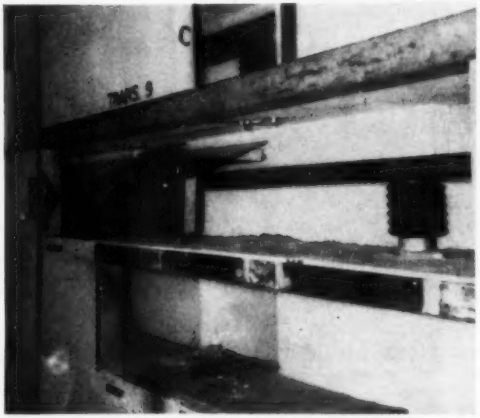
As the old bus was removed, holes had to be drilled through the concrete cubicle bottoms, to receive through bolts to secure the new insulating supports. These holes had to be accurately spaced to permit pre-fabrication of the copper channel sections into units that could be rolled into place and bolted down with no redrilling or filing after the sections were inside the cubicle tunnel.

By tracing the hole patterns for each end of the channel sections, then reproducing them, templates were made to be pasted onto the channels to guide the hole-punching operation. To locate the bolt holes in the cubicles, a wooden jig was constructed, and used to mark the holes to be drilled. An insulating shield, mounted on small casters, was devised to serve double duty as worker protection from the energized bus bar sections, and to divert the concrete dust broken out by the drilling operation. Wooden dollies were made up on which to roll the channel sections through the cubicle tunnel, to position them over the bolt holes.

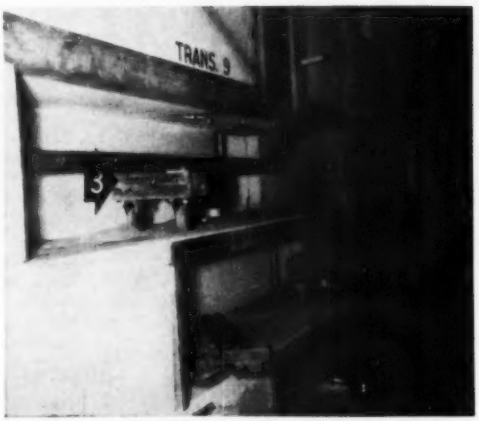
The actual replacement sequence was as follows: a section of old bus was removed and its support bolts burned off; while new slab holes were being laid out and drilled, one cubicle face was removed to insert the long channel; the bus taps were re-punched to their new diameter, and silverplated to the bus; the channel was placed on the dollies, in the cubicle tunnel; insulator supports were secured to the channel; the channel assembly was rolled through the tunnel into place, slid off the dollies and bolted down; splice plates, taps and connectors were bolted on, and the job was complete.



Components of the jig used to lay out holes in the concrete cubicle bottoms. Notched lengths are centering aids



Insulating shield, mounted on casters, protects workers from hot bus bar, keeps dust from bus during concrete drilling



Copper channel bus with insulating supports attached is moved through the cubicle tunnel on two-wheeled dollies

CAUGHT IN A FLOOD

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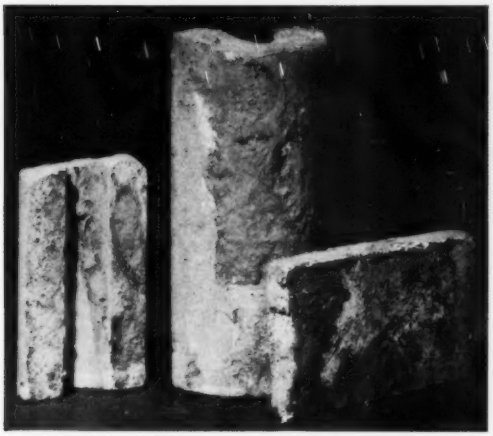

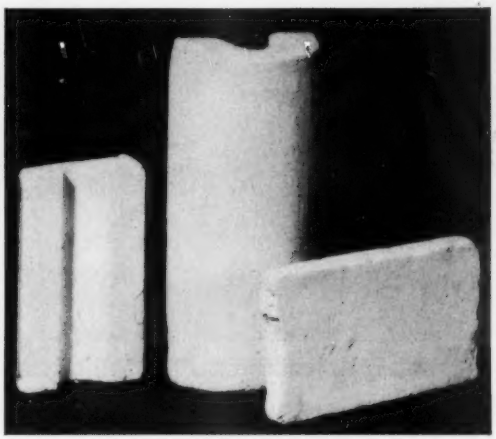

WATER SOAKED AND CAKED WITH MUD, these three pieces of Kaylo Heat Insulation were found partially buried in the Kansas City, Missouri, warehouse of Procter & Gamble after nearly two weeks of Missouri River flood water had receded. The unretouched photograph above shows the wet and mud covered pieces as they looked on arrival at the laboratories in Toledo, Ohio after shipment in a loosely-packed carton.

THE SAME THREE PIECES are shown in this unretouched photograph after they were cleaned by holding them under a water faucet and rubbing by hand, then dried with an electric fan. These pieces are still usable—*proof* of Kaylo Heat Insulation's resistance to water damage. Other Kaylo Heat Insulation, already installed at this plant, was under water during the flood, yet is still in place and performing efficiently.

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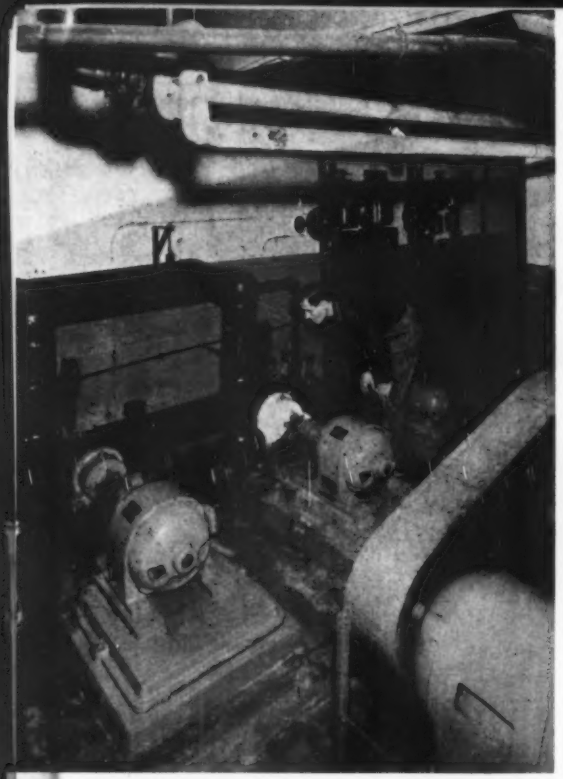

Regenerative pumps circulating brine and ice water in hotel

PUMPS—

Where to Use Them and How to Use Them

Application, operation and maintenance of several types of pumps commonly used in industry are discussed here . . . Pointers on use of pumps under exacting conditions . . . Tips on pump trouble shooting

WHILE CENTRIFUGAL PUMPS are widely used throughout industry today, there are several other types extensively employed. It is the purpose of this article to treat of the operation and maintenance of these latter types.

A type of pump similar to the conventional centrifugal pump is the regenerative or turbine pump. In this pump, the entering liquid flows to both sides of the impeller and enters the vanes cut in the impeller rim, as shown in Fig. 1 at (a). The centrifugal force of the impeller vanes throws the liquid into the casing passage, Fig. 1 at (b), where the rotating motion imparted to it by the shape of the impeller vanes is contained.

This process is repeated a number of times as the liquid travels around the pump casing to the discharge nozzle. Each time the liquid enters and leaves the impeller vanes additional energy is imparted, thus adding to the generated head.

The regenerative pump will handle both liquid and vapor, provided that there is sufficient liquid available to seal the space between the impeller and the sealing wall of the pump casing. This permits the pump to remove air from the suction line until the pump is primed. A suction trap can be employed to prevent loss of sealing liquid when the pump is stopped.

Care must be taken that a regenerative pump be not operated with discharge valve closed, because under such conditions the head increases rapidly and the driver will be overloaded. For this reason, a relief valve or pressure cutoff should be provided if the pump discharge may be restricted.

Regenerative pumps may be unsuited for certain conditions where corrosive or abrasive fluids must be pumped, because of close internal clearances, unless specially constructed. And they are not suited to the pumping of high viscosity liquids.

Regenerative pumps can, however, pump against a much higher head than comparable centrifugal pumps, have a higher suction lift than any other type of liquid-handling pump, and have a wide operating range which gives them considerable flexibility.

The regenerative pump is more efficient than a centrifugal pump for capacities up to 50 gpm, and equally efficient for capacities up to 100 gpm. However, under normal clear liquid-handling service, regenerative pumps usually have an operating life of only one-fourth to one-third that of a centrifugal pump before their clearances require renewing. Some types are constructed with renewable liners so that they and the impeller can be replaced, thus restoring the pump to new condition. It is also possible to renew clearances in some types by changing the gasket thicknesses.

Regenerative pumps are generally light in construction and hence should be protected against misalignment caused by improperly supported piping. Impellers sometimes stick because of foreign materials in the liquid being pumped or because of corrosion of the metal.

Vertical Turbine Pump

Another type of pump similar to the conventional centrifugal pump is the vertical turbine pump. This pump was originally designed for pumping water from wells, but is now also used for a number of other purposes, including mine dewatering, process circulating, drainage, and cooling tower water circulation.

When employed as a well pump, the vertical turbine pump is provided with a sectional shaft and enclosing column of a length depending upon the depth of the well. The pumping element (called the bowl assembly), Fig. 2, includes the suction case, impeller, bowl and discharge connection, which couples to the lower end of the shaft enclosing column. Where lift requirements necessitate a multi stage pump, sufficient additional duplicate bowls and impellers are provided.

The pumping element is of a diameter that will permit it to be lowered down the well casing with which it is used, and the impeller

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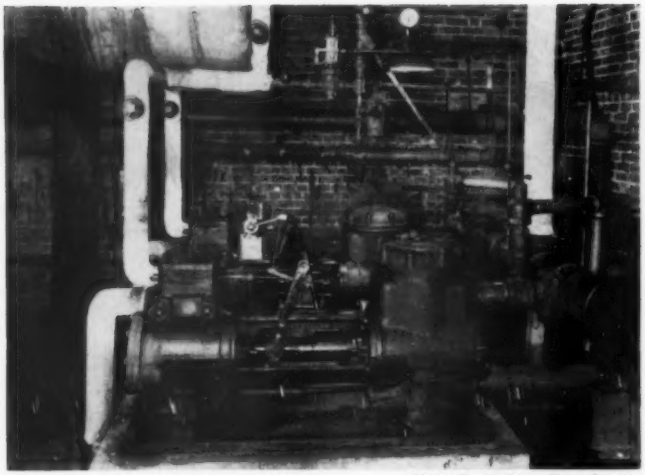

Photo: Warren Steam Pump Co., Inc.

Two horizontal duplex, steam-driven, piston pumps in use at Pentucket Mills

is usually submerged in the liquid to be pumped.

Vertical turbine pumps when employed for other than well pumping are usually relatively short, the bowl assembly sometimes being connected directly to the driving head.

The bearings of vertical turbine pumps may be lubricated with lubricant or with the liquid pumped, or a combination of both, depending upon whether for use in wells or in other types of service, and whether the shaft is open or enclosed.

As with other types of pumps, improper application or faulty installation can result in operating difficulties. For example, if the capacity of the pump is too great for the well, vibration and cavitation of the pump may occur and cause excessive wear.

Unnecessarily rapid deterioration of pump parts can also occur if the materials of which the pump is constructed are unsuitable for the liquid being pumped. Some types of water require the use of special materials.

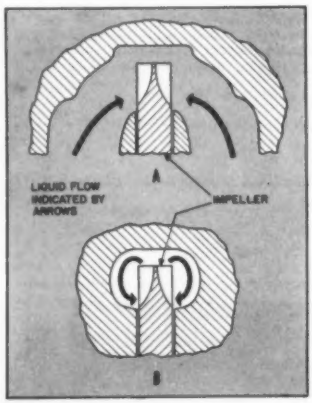

Fig. 1. Turbine pump is often called a regenerative pump because energy is imparted every time liquid enters and leaves the pump's impeller vanes, shown

For successful pump operation, be sure to carefully follow the instructions of the manufacturer. On lubricant-lubricated pumps, see that the proper kind and amount of lubricant is fed to the bearings, neither too much nor too little. The packing used on water-lubricated pumps should be kept properly adjusted and should be renewed when necessary. Float and pressure controls should be inspected periodically for wear, and adjusted when necessary. Wells sometimes require cleaning or repairs, and tanks, pits and sumps should be checked periodically and kept in proper condition.

In operating a vertical turbine pump, troubles may develop from time to time, and it is important to be able to interpret the symptoms in order to correct the faults.

If the pump fails to deliver liquid while it is operating, it may not be primed. This may be due to failure to have the well vented to atmospheric pressure, or to have the lowest impeller submerged in the liquid. The latter trouble may be caused by overpumping the well and thus lowering the liquid level excessively.

If the liquid level is lowered sufficiently to exceed the pump's lifting capacity, the pump will likewise fail to deliver liquid. The same thing will happen if the discharge from the pump is restricted sufficiently to raise the pumping head above the capacity of the pump. This may be due to a partially closed discharge valve or a jammed check valve.

Other possible causes of failure to deliver liquid are clogged strainer, suction pipe or impeller. It may be necessary to backwash to clear such obstructions. In the case of a well, the well screens may be clogged.

Low pump speed can also cause the pump to fail to deliver liquid, but, if the speed is correct, perhaps the shaft or bowl assembly may be broken or the impeller loose, or the column pipe joints may not be liquid-tight.

Low liquid delivery capacity can be caused by excessive pumping head, improperly vented well, suction obstructions, air leakage into the suction piping, air trapped in the liquid, excessively low speed, and, in the case of sump or pit pumps, eddying or turbulence at the pump's suction due to incorrect sump or pit design. Additional possible causes include leakage in the pump, column or piping, incorrectly adjusted, loose or worn impeller, worn wearing rings, or worn bearing below the relief vent allowing excessive leakage through the vent.

If liquid enters the shaft enclosing tube, the trouble may be due to leaking or broken enclosing tube, loose or broken bearings, plugged relief vent, worn pump shaft, or worn or scored bearing below or above the relief vent.

Pump vibration can be caused by misalignment of operating parts, bearing wear (possibly caused by excessive sand in liquid), incorrect suction conditions, foreign material lodged in impeller or bowl passages, or excessive wear of rotating parts due to abrasive in liquid.

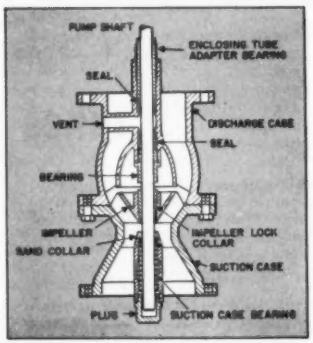

Fig. 2. The vertical turbine pump is often used for mine dewatering, drainage, tower circulation or similar uses

If the pump refuses to start, check the driver and controls first. If electric, look for tripped overload device, blown fuses or tripped circuit breaker, or open control circuit.

If the motor operates when disconnected from the pump, the trouble may be due to excessively tight packing, bearing friction caused by lubrication failure, bearing misalignment due to loose tube tension nut, bent shaft, misalignment of the

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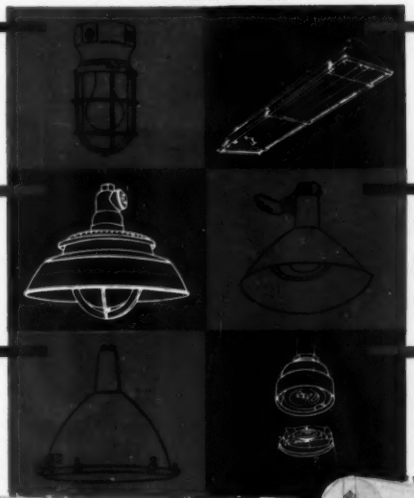

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pump, or improper location of enclosing tube stabilizers.

Other causes of failure of the pump to rotate include incorrect impeller adjustment, impeller jammed with sand or locked by corrosion or bacterial growth or, in the case of a pump handling sea water, by barnacle accumulations. Foreign objects entering the pump suction may also jam the impeller.

Where low temperatures prevail, the pump may jam from freezing.

Another form of rotating pump is the rotary type. This consists of a casing in which gears, vanes, screws, pistons, plungers, etc., rotate. Minimum clearances of operating parts produce a positive displacement of liquid.

Gear Pump

In the gear type rotary pump, Fig. 3, one gear is keyed to the operating shaft while the meshing gear rotates freely on an idler shaft. The gears may be of the spur, herringbone or helical type. The liquid fills the spaces between the teeth as they separate on one side, is carried around the case by the teeth, and is squeezed from the spaces as the teeth mesh on the opposite side.

In order to eliminate the excessive pressure that would be built up in the liquid trapped between the closely meshing teeth of certain types of gears, and thus avoid overloading the bearings, pressure relief fluid holes are provided, as shown in Fig. 3, leading from the roots and tops of the idler gear teeth to the shaft on which it rotates. This shaft is provided with fluid directing grooves, so that fluid trapped between the meshing gear teeth flows into the pump discharge through the right hand groove, while fluid flows from the pump suction through the left hand groove and gear holes to break the vacuum caused by the separating gear teeth.

Vane type rotary pumps are built with sliding vanes, Fig. 4, swinging vanes, and roller type vanes. These vanes are arranged inside a rotor that rotates inside an eccentric casing. The rotation of the rotor traps liquid between the vanes and carries it from the suction to the discharge of the pump. Centrifugal force maintains the vanes in contact with the wall of the pump casing. In some types of vane rotary pumps, liquid pressure is utilized to force the vanes outward from the rotor.

In screw type rotary pumps, two or more screws are arranged to mesh closely and to run close to the walls of the casing, thus providing a liquid-tight seal. In these multi screw designs, the liquid usually enters the screw thread spaces at the outer ends and is forced toward the discharge at the center of the pump by the rotation of the meshing screws. The screws are geared together with gears mounted on their shafts.

Single screw rotary pumps are provided with a threaded rotor that rotates, with very little clearance, in a double-threaded helix, usually made of soft or hard rubber. The eccentric motion of the rotor as it rotates advances the liquid from the suction to the discharge of the pump. This pump may be run in either direction, the suction and discharge ends being reversed upon reverse of direction.

Piston Rotary Pumps

Piston and plunger rotary pumps consist of rotating cams that operate pistons and plungers in such a way as to alternately produce a suction and pressure, thus drawing liquid into the pump casing and forcing it out the discharge. Usually two pistons or plungers are provided, so that the liquid flow is continuous.

Rotary pumps are generally self-priming but should not be permitted to run dry. If necessary, they should be primed before starting.

Rotary pump operation is quite simple, but if given inadequate attention trouble can easily develop.

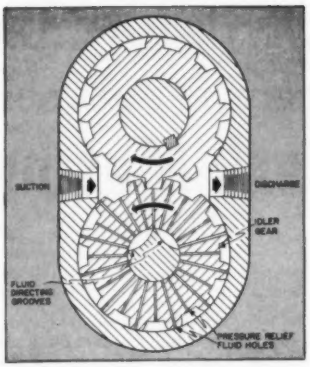

Fig. 3. In order to eliminate excessive pressure between the teeth and consequent overloading of bearings, relief holes are provided on gear type pumps

If the pump fails to deliver any liquid be sure to stop it immediately. This condition may be due to the pump not being primed, the lift too high, wrong direction of rotation, speed too low, strainer clogged, or valve closed.

Where the pump fails to deliver a sufficient quantity of liquid, the speed may be too low, the lift may be too high, or air may be leaking into the inlet line or through the stuffing box.

If the pump delivers liquid for a while, then stops delivering, the trouble may be due to air or gases trapped in the liquid, air or gas pockets in the inlet line, leaky inlet line, inlet line not immersed sufficiently in liquid, vaporization of liquid in the inlet line, or pump worn by abrasive contained in the liquid pumped.

Noisy Operation

Noisy pump operation can be caused by insufficient liquid supply, air or gas pockets in the inlet line, air leaking into inlet, coupling unbalanced, pump misalignment, or the pump operating against excessive pressure.

Where the pump parts show rapid wear, the trouble may be due to abrasive in the liquid, insufficient or no liquid supply, piping imposing strain on pump, roughness of parts due to corrosion, operating against excessive pressure, or the pump running dry.

Reciprocating pumps differ considerably from the other types mentioned. They are of two general types, steam driven and rotary power driven. Reciprocating pumps are further classified as simplex (single cylinder), duplex (two cylinders), triplex (three cylinders), etc. A further classification refers to whether the pumping element is a piston or a plunger, whether it is single acting or double acting, and

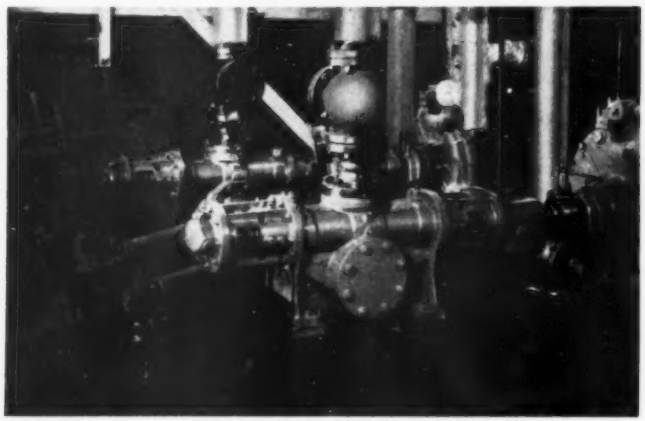

Photo: Warren Steam Pump Co., Inc.

Two screw-type rotary pumps installed at Yonkers Electric Light and Power Co.

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whether (if plunger type) the plunger is inside or outside packed.

Steam driven reciprocating pumps are powered by direct acting steam cylinders and pistons, whereas power driven reciprocating pumps employ several forms of transmission between the motor, engine, or other power source and the pump.

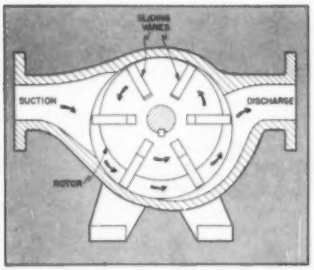

Fig. 4. Centrifugal force maintains the vanes of a vane type rotary pump in contact with casing walls as shown

Both steam and power driven reciprocating pumps are made in horizontal and vertical types.

Steam pumps can be readily controlled by adjusting the steam supply, to permit the desired quantity of liquid to be pumped. Power pumps, however, are not as readily controlled since variation of speed is generally more complex, or in some types impossible. However, steam pumps are not usually economical in their use of steam unless the exhaust steam can be utilized.

Simplex direct acting steam pumps depend on a steam thrown cylinder valve arrangement to prevent the pump from stopping on center. Duplex pumps do not require this type of valve since the movement of each side of the pump actuates the steam valve of the other side mechanically. Because of this arrangement, it is impossible for a duplex direct acting steam pump to stop on center.

Power driven reciprocating pumps include motor, internal combustion, and hydraulic driven types, and the kinds of power transmission include gears, belts, chain and direct connected.

Pumping Elements

Steam and power pumps employ two general types of liquid pumping elements, piston and plunger. In the piston type, soft fibrous, bakelite and self-sealing cup packing, as well as metal rings, are used to seal the piston against liquid leakage.

As shown in Fig. 5, soft fibrous packing rings should be carefully installed, so that sufficient space is provided between the packing and piston and between the packing and packing space. This prevents jamming of the packing, and permits liquid pressure to act on the inside and one end of the packing to hold it against the cylinder bore and the other end of the packing space, thus sealing the piston. The packing rings should be cut slightly short of exact measure to allow for extension of the material after it becomes wet.

In the plunger type of pump, soft packing is generally employed to seal the plunger. There are three types of plunger packing arrangements: inside packed, center outside packed, and end outside packed. In the inside packed construction, the packing through which the plunger operates is located inside the liquid chamber of the pump and hence excessive leakage cannot be detected while the pump is operating.

Pumps arranged for center outside packing have a single plunger operating through tandem liquid chambers, the ends of the two chambers facing each other being provided with stuffing boxes through which the plunger operates. These stuffing boxes are exposed and this feature permits leakage in excess of packing lubrication requirements to be detected.

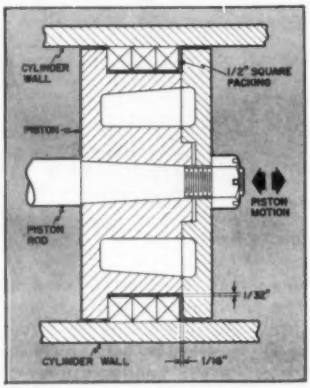

Fig. 5. Sufficient space should be provided between packing and piston and between packing and packing space to prevent jamming of packing and to permit liquid pressure to act on the packing

Where end outside packing is employed, Fig. 6, the plunger stuffing boxes are located on the opposite ends of the tandem liquid chambers. In this type a separate plunger is used in each liquid chamber, the two plungers being connected by side rods.

Since liquid pressure cannot be employed to seal the packing rings of plunger pumps, an adjustable gland is provided, similar to that used on rod stuffing boxes, to apply pressure to the packing to seal the plunger.

In operating reciprocating pumps certain precautions must be taken, and when troubles develop, the symptoms should be analyzed in order to determine the causes.

Every power pump should be provided with a relief valve capable of discharging the full pump capacity when the pressure rises a predetermined (usually 10 per cent) amount above normal. This valve should be directly connected to the discharge manifold.

Analyzing Troubles

Where needed, suction strainers should also be provided. Suction piping should be as short and direct as possible, of sufficient size, and should slope uniformly upward toward the pump. All piping connected to the pump should be adequately and properly supported.

In analyzing pump troubles, failure of a duplex direct acting steam pump to start may be due to low steam pressure, rarely to condensate in the steam line or pump cylinders.

If a simplex pump strokes to one end and stops, condensate may be the cause, but sometimes the movement of the steam thrown valve piston may be prevented by heavy oil, where the pump has been idle for some time.

Sometimes the steam valves may require adjusting or setting. The procedures for this work vary according to the type of pump and it is therefore well to follow the instructions of the pump manufacturer.

If a steam or power operated reciprocating pump fails to deliver liquid, the trouble may be due to priming failure, leaky liquid valves, air leaking into the suction, worn liquid piston packing, or air trapped in the pump cylinder or suction line.

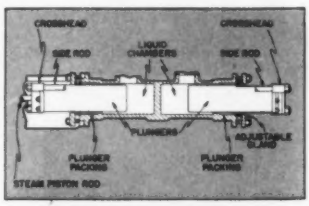

Fig. 6. With this type of packing liquid pressure cannot be employed to seal the packing rings. An adjustable gland is provided for ring-sealing purposes

Where a pump fails to deliver full rated liquid capacity, the cause may be leaking liquid valves or piston packing, or air leaking into the suction. If the trouble is due to inadequate speed in a steam pump, low steam pressure, high exhaust pressure, steam piston leakage, or excessive packing tightness may be the cause.

Noisy pump operation may be due to misalignment, tight piston packing, or, in the case of power driven pumps, suction or discharge line too small, air or gas in liquid, suction lift too high, broken or weak valve springs, speed excessive, worn bearings or crosshead, or noisy gears due to weak or improper adjustment.

. . where space is a problem

. . . the Fairbanks-Morse Axial Air Gap Motor is the solution to your motor drive problems. For this unique motor is 40% shorter . . . 30% lighter than conventional models.

Like all motors that bear the Fairbanks-Morse Seal, the Axial Air Gap has the traditional strength, balance and electrical stability that assure you maximum service life.

Whether you are interested in a single motor, or thousands—one type and size, or a variety of types and sizes—you'll find that Fairbanks-Morse Motors are designed and built to fill your needs.

When you look for electric motors—for standard or unusual applications—*always* look for the Fairbanks-Morse Seal. For over 120 years it has stood for the finest in manufacturing integrity to *all* industry. Fairbanks, Morse & Co., Chicago 5, Ill.

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SELECTION, USE AND CARE OF TOOLS

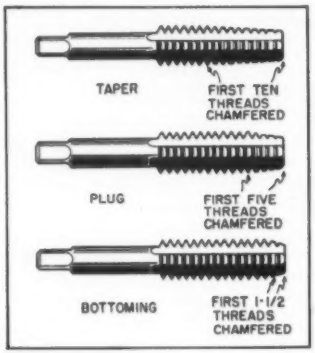
Taps and Dies—Article discusses taper, plug and bottoming taps; also, how to set adjustable dies for proper thread depth

By THOMAS TRAIL, Maintenance Engineer

TAPS AND DIES are made in a number of types, covering the various kinds of threads, and in several degrees of fit tolerance. It is therefore necessary to know what kind of threading is to be done, and the degree of accuracy to be maintained, before being able to intelligently select suitable taps and dies for the work.

On ordinary shop jobs, usually regular cut or ground thread taps are suitable. For hand threading, carbon taps should be selected. High speed steel taps are required only on tapping machines operating at relatively high speeds.

Taps are made in three graduated patterns: taper tap, plug tap, and bottoming tap. For general hand tapping, the taper tap is used first, since it has a large number of the beginning threads chamfered in order



The taper, plug and bottoming taps are used for cutting internal threads

to remove metal gradually. In relatively thin metal sections, where the number of full threads on the tap are sufficient to thread the hole full thread throughout its length, this tap will suffice.

Where thicker metal is to be tapped, however, the taper tap should be followed by the plug tap, which has fewer chamfered threads. Sometimes, for economy, only a plug tap is used for such work, but this may result in breakage of the tap due to the faster rate of metal removal causing the tap to jam.

The bottoming tap is employed after the taper and plug taps, where the hole to be tapped is "blind," that is, does not go through the metal, and where it is necessary to tap threads practically to the bottom of the hole.

Taps can be obtained in sets of three, comprising taper, plug and bottoming tap, all of the same thread size, or they can be purchased separately. If possible, it is better to procure complete sets of each needed thread size, in order to be prepared to handle all types of threading jobs.

Before using a tap to thread a hole, the hole should be drilled or reamed to correct diameter. If the hole is too large, the resulting thread will be too shallow and will be weakened. On the other hand, if the hole is too small, the resultant thread will not have sufficient clearance when a standard screw or bolt is threaded into it, and the tap may also be broken due to excessive friction when tapping the hole.

A 75 per cent depth of thread is recommended as being generally satisfactory. In determining the decimal equivalent of the nearest drill size required for tapping a particular size of thread, refer to a table of thread sizes and corresponding tap drill sizes in a machinists' handbook.

When drilling, tapping or cutting threads in or on cast iron or brass no cutting compound is required. However, the use of a cutting oil, or soluble oil, is advisable in order to produce good threads in steel, malleable iron, copper, aluminum and aluminum alloys.

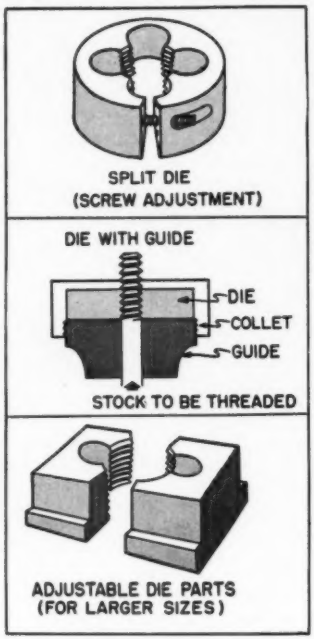
In use, taps must be clamped rigidly in a suitable holder, started carefully into a drilled hole so as to follow the hole direction, and rotated steadily, with even pressure. Taps break very easily. Therefore, if the tap jams, back it out of the hole a thread or two and try again. It is also necessary to back the tap from the hole and remove any accumulated chips at times, and very frequently when tapping blind holes.

A broken tap can sometimes be heated with a very narrow torch flame, to draw the temper, and drilled from the hole. Commercial tools are also available to extract broken ends of taps.

Generally, regular commercial dies, adjustable or non-adjustable pattern, will prove satisfactory for general shop work, but when used in conjunction with lathe threading, should be operated at speeds in accordance with those recommended in machinists' manuals or lathe operators' handbooks. Dies are available in several outside diameters or sizes, and in renewable type for use in collets or holders.

Before starting to thread a rod with a die, first bevel the rod end slightly with a file or grinding wheel. This will permit the die to start more easily. Have the die clamped tightly in the holder and the chamfered side of the die leading; and frequently remove accumulated chips by backing die off the rod.

Adjustable dies should be set for proper thread depth by threading



Shown are various types of dies which are used when cutting external threads

the die onto a standard bolt or screw of proper size and thread, then tightening the die until there is a pronounced amount of friction when the die is backed off the thread. It is well to test thread a scrap length of rod afterwards to determine whether any further adjustment is necessary, employing a standard nut to test the clearance of the newly cut thread. In adjusting dies, be sure no chips are present to affect the adjustment.

new 1200 amp. AMPROBE

Take the new Amprobe "1200" into your hand. Compare it with any other high-current volt-ammeter. You'll quickly recognize the advanced engineering and design that have gone into the "1200".

ELIMINATES ERRORS: Exclusive doughnut-type transformer eliminates for all practical purposes the factor of error due to position of conductor. COVERS NINE RANGES: 0-15/60/150/300/600/1200 (yes, 1200) amps AC, 0-150/300/600 volts. SAFER: Probe jaws insulated right down to the sockets. Voltage test lead plug automatically insulates itself when removed from meter. MORE CONVENIENT: So compact, carry it in your pocket!

Only $67.50, with leather case and leads. Also Amprobe "600", up to 600 amps, $59.50. Pyramid Instrument Corp., Lynbrook, New York.
(Export Division: 458 Broadway, New York City. Cable: Morhanex).

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Lynbrook, New York

☐ *Send Bulletin No. 128, describing new Amprobe Models "1200" and "600".*

☐ *Send 16-page manual of time-saving uses: "Servicing with the Amprobe".*

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NEW PRODUCTS summarized for your convenience

Edited by M. E. Heniken

Ask for Item 1

PLATFORM HIGH-LIFT has extra large end-dump hopper

Built with an 80 cu ft end-dump hopper, this truck is suggested for handling bulky loads of loose materials such as sand, gravel, aggregate, sawdust, metal chips, ashes and scrap. The hopper can be tilted downward to scoop up loads, or loaded from overhead. The truck is a 4000-lb capacity, a standard electric-powered high-lift with a specially shortened platform to accommodate the hopper, and the platform elevating mechanism is used to dump hopper. *The Yale & Towne Mfg. Co.*

Ask for Item 2

PIPE INSULATION offers dual-temperature protection

A new low cost Fiberglas insulation is available for pipe lines operating at low temperatures or alternate cycles of high and low temperatures. This dual-temperature product is preformed in easy-to-apply hemi-cylinders and segments to fit standard pipe and tubing sizes. A vapor barrier composed of laminations of asphalted kraft paper and aluminum foil adhered to the Fiberglas insulation with a bituminous adhesive, provides condensation control on cold lines passing through warmer temperatures and permits economical operation of such pipes.

To seal lap joints between sections,

a 4-in. strip of vapor barrier is supplied, as shown. These strips, together with the jack flaps, are sealed with the vapor barrier adhesive. Dual temperature insulation may be used on pipe temperatures from sub-zero to 250 F—for outdoor use a roofing felt jacket should be sealed around the vapor barrier. Insulation for pipes more than 12 in. dia is furnished in three segments. Soft copper wire holds the segments in place. *Owens-Corning Fiberglas Co.*

Ask for Item 3

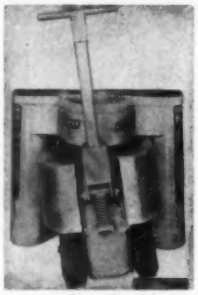
BALL BEARINGS are sealed to keep lubricant in, dirt out

Interchangeable with non-sealed bearings, the new Red Seal Ball Bearings incorporate a seal made of DuPont Fairprene, which is said to be unaffected by petroleum-base lubricants, normal operating temperatures or ageing. According to manufacturer, a design providing effective sealing—with light contact and low friction—extends the seal below the retaining ring to form a flexible lip which lightly touches a smooth, uniform chamfer of the inner ring. The bearings are delivered factory lubricated. *SKF Industries, Inc.*

Ask for Item 4

LIFT TRUCK features 1⅝ in. power drive wheel articulation

The 1⅝ in. articulation of the dual drive wheels of this company's newest model Go-Getter is said to give it unusual traction under even such adverse conditions as uneven floors and those



worn and roughened with use. This feature also lets it glide over door saddles and go up and down ramps easily, bringing loads to destination in good condition. The new model also incorporates other features of the Go-Getter line, including fingertip controls and automatic braking of the "deadman" type. In addition to the mechanical brake a dynamic brake is provided. *Revolvator Co.*

Ask for Item 5

FLARING TOOL for automatic burnishing of the flare face

The 500-F Rol-Air is for flaring soft copper, steel, aluminum and brass tubing, making 45 deg flares on 3/16 or 5/8 in. OD tubing for standard SAE flared fitting joints. The automatic burnishing action is provided through the use of a lost motion mechanism in the yoke which disengages the feed during the first revolution when backing off the cone. This causes the cone to burnish the flare and give it a polished finish. The cone is hardened steel, multifaced type, with tool chrome finish.

In this tool the flare is formed in the air above the flaring bar instead of against a bevel in the bar. This is said to maintain original wall thickness of the tubing at the base of the flare and result in stronger flares. Full information about the tool is given in Bulletin 3003. *The Imperial Brass Mfg. Co.*

Use the postage-free cards on pages 37-38 and 171-172 to ask for more information on these products. List item numbers of those products in which you are interested.

Ask for Item 6

FASTENERS for roller chains have long life expectancy

Rollpins are chamfered-end slotted-steel cylinders that compress easily into a pin hole smaller than their own diam-

eter, expand and lock in place until removed by hammer and punch. These new fasteners, which will be available on most of the larger pitches of this manufacturer's standard and heavy-series chains, can be re-used almost indefinitely. According to company, they greatly outlast cotter pins, and are extremely durable, being equal in strength to cold rolled pins of the same diameter. *Morse Chain Co.*

Ask for Item 7

SNAP-ACTION SWITCH for rugged, cam actuated service

This switch is designed to make or break steady state currents of 20 amp and handle inrush currents up to 75 amp. It has a roller plunger actuator adapted to operation by cams with a rise of up to 30 deg, and is available with plunger on the right or left side

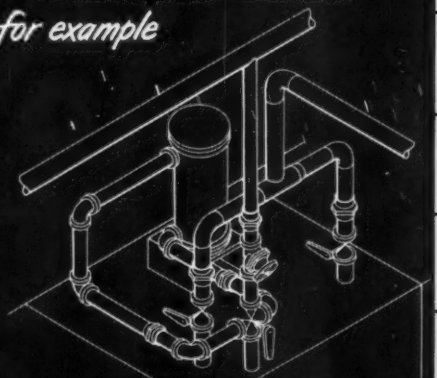
of the enclosure. Plunger assembly can be turned to any position necessary to align its roller with direction of cam approach and then a nut is tightened to clamp the assembly in position.

A die-cast aluminum enclosure is

(Continued on page 144)

Are Your Valves Behaving This Well?

...on River Water, for example



THE INSTALLATION

Crane Iron Body Diaphragm Valves on hydraulic lines to cylinder operators on ash pit gates; Southwark Station; Philadelphia Electric Company.

VALVE SERVICE RATINGS

SUITABILITY:	Good design for gritty fluid
FEATURES:	Neoprene disc insert-resists cutting
MAINTENANCE COST:	Making big savings here
SERVICE LIFE:	Already 6 to 9 times longer than other valves
CORROSION-RESISTANCE:	O.K. no sign of corrosion
PRICE:	Better than many ordinary valves
AVAILABILITY:	Regular number in Crane line

THE HISTORY

Valves were installed in the hydraulic system when the control cocks failed to shut off tight. But like the cocks, conventional valves put in this service didn't stand up. They couldn't handle the abrasive, sandy river water used for hydraulic operators as well as for ash pit sluicing. They leaked badly in 3 to 5 weeks; had to be replaced.

The problem was solved with Crane Iron Body Diaphragm Valves. Installed more than 7 months, there's been no leakage since; no valve trouble of any kind. The Neoprene disc insert and wide, flat seating surfaces in Crane Valves show no effect of abrasion. Their completely sealed bonnet keeps working parts free of grit.

THE VALVE

In Crane Packless Iron Body Diaphragm Valves, the Neoprene diaphragm acts as bonnet seal only; is not subject to crushing and rapid wear. Separate disc with Neoprene insert shuts off flow even should diaphragm fail. Made unlined or with full Neoprene body lining. Well suited for erosive fluids, sludges, slurries; also for many corrosive services. See your Crane Catalog or call your Crane Representative.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

CRANE VALVES

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BARRETT

LIFT-TRUCK and SKID SYSTEM

Put an end to multiple handling. Repeated loading, unloading, piling and unpiling waste your time and money. One Barrett hand-operated Lift-truck moving skid loads, will speed your room-to-room, floor-to-floor storage and shipping operations. Let the versatile, mobile **Barrett System** take care of all intra-plant material handling at surprisingly low cost.

HOW THE BARRETT SYSTEM SAVES YOU MONEY

1. **Load stays on the skid wherever it goes—always ready to move.**
2. **The Barrett Lift-truck moves skid loads as units where and when you want them—fast!**
3. **Only one operator—not a 3- or 4-man handling crew.**

A Barrett engineer will gladly show you how to move more material in less time, with less man power. There is no obligation, of course. *Write for Bulletin 5110.*

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Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4 . . . WITH A BARRETT

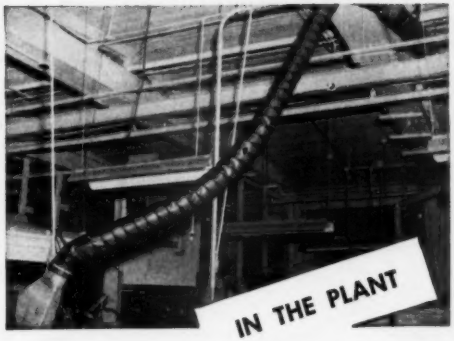
Above: **Popular Hydrolift Model ED hand-operated Lift-truck.** Easily handles 2500 lb. loads. Available in 4000 and 6000 lb. capacities. 7 strokes for full 4" lift.

STEELEG SKIDS. Replaceable hardwood platforms; manganese steel angles. Any width and length. Plain, box-top or stake platform.

SINGLE STROKE HAND LIFT-TRUCKS just run truck under skid and raise with ONE STROKE. Step on release treadle—load lowers gently by hydraulic check. Model J (illustrated) 2500 lb. cap., 17⅜" and 23⅞" wide. Model R, 4000 lb. cap., 17⅜" and 24⅛" wide.

Fork-type Model EX hand-operated Lift-truck for handling pallet loads up to 60" long with easy hydraulic lift.

Why move work around to get to present exhaust ducting?



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Best of all, YOU CAN INSTALL SPIRATUBE YOURSELF! That cuts down-time, keeps your production line going. The initial cost of Spiratube is small . . . and its life equals – sometimes exceeds – rigid ducts.

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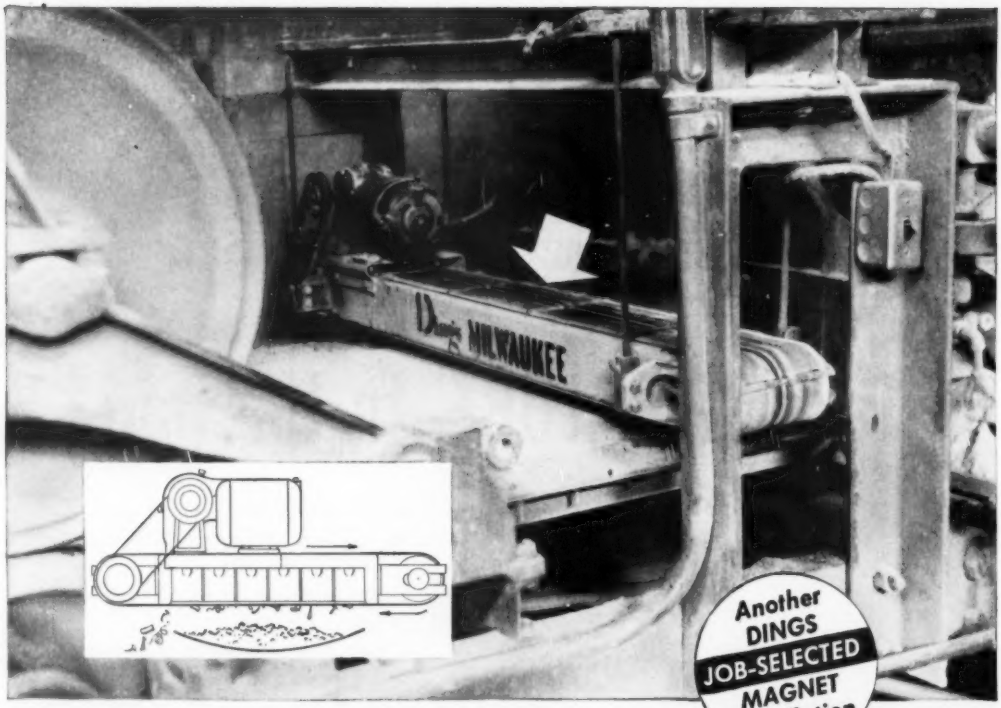


Another DINGS JOB-SELECTED MAGNET Installation

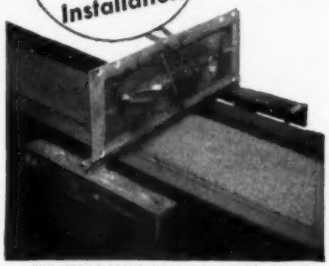
ASBESTOS MINUS IRON EQUALS SALES GOLD

DINGS MAGNETS DO THE SUBTRACTING

HOMEOWNERS like the superior quality of asbestos shingles but if the shingles don't look like wood, they won't buy, says one of the biggest manufacturers of asbestos building materials in the business. So the shingles are passed through engraving rolls to give them the textured appearance of wood. A problem raised by this process and solved by a Dings self-cleaning non-electric Perma-Plate magnet (big illustration) is TRAMP IRON—nuts, bolts, wires, etc. which get in the asbestos during previous processing. This iron would wreck the rolls, alter the pattern and eventually cause rust spots in the installed material. The Perma-Plate gets it all out—automatically.

WHY was the Perma-Plate selected for this job over all other types and styles of magnets in the Dings line? *The specific application dictated its choice.* The magnet was "job selected." Whatever YOUR tramp iron problem, buy a Dings job selected magnet and KNOW it will be successful.

DINGS MAGNETIC SEPARATOR COMPANY
4766 W. Electric Ave., Milwaukee 46, Wis.

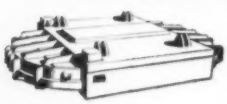


THE PERMA-PLATE (shown here without self-cleaning attachment) is non-electric, permanently magnetic. This magnet is particularly effective where the burden depth does not exceed 3".

THIS CATALOG HELPS YOU TO "JOB SELECT" A MAGNET

Is the material you want de-ironed a solid . . . . semi-solid . . . liquid? Is it carried in chutes . . . ducts . . . conveyor belts? Catalog 5000-B lists Dings complete line by application, describes all Dings magnets from the low cost, non-electric "Perma" Plate magnet to the most powerful magnetic separators known. Send for it today.

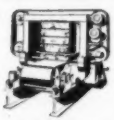
DINGS MAGNETS

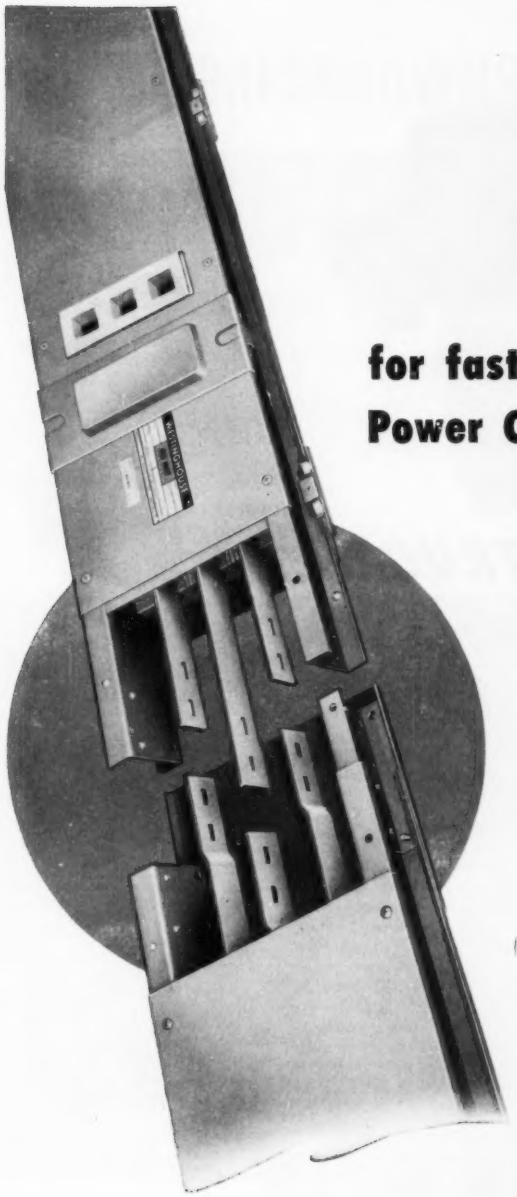

Rectangular

High Intensity Induced Roll

Non-Electric and Electric Pulleys

Non-Electric Drums


High Intensity Type EBK Crossbelt



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for faster, lower cost Power Conversion or Expansion

Wasting time unraveling wire mazes? Wasting money "doubling up" on cable? Check these points of convenience provided in Westinghouse Bus Duct to speed power-line layout, simplify installation.

- Prefabricated sections, any length . . . convenient to handle, mount, and install with channel-type splice plates (illustrated).
- Plug-in receptacles every foot . . . eliminate long, secondary cable runs, facilitate rapid machine tie-ins, any time.
- To extend power-line runs . . . simply add sections of duct.
- To relocate duct . . . dismantle, rearrange, remount . . . no cable slicing or splicing; equipment fully salvageable; minimum outage time.
- Standardized ells, tees, crossovers . . . no problem with tight layouts, turns in any plane.
- Cantilever hangers . . . quickly aligned and bolted.
- Higher carrying capacity pound for pound than cable or conduit.
- 4 types of Westinghouse Bus Duct meet all load requirements, any service condition from transformer to machine.

Call your Westinghouse distributor for the full story, or write for Bus Duct Manual B-4272A, Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-30057

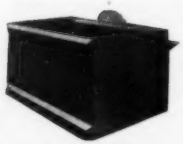
DESIGN TESTED AND VERIFIED IN THE Westinghouse HIGH POWER LABORATORY

YOU CAN BE SURE.. IF IT'S Westinghouse BUS DUCT

WHY USE 3 TO 5 TRUCKS... WHEN ONLY ONE WILL DO?

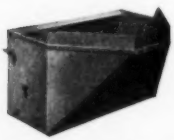
In many plants a Dempster-Dumpster, like the one above, operated by only one man, the driver, has replaced 3 to 5 conventional trucks and crews. The reason for this is that one truck-mounted Dempster-Dumpster serves scores of Dempster-Dumpster Detachable Containers up to four times the capacity of the average dump truck body. These containers are built in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish. Containers are conveniently located at accumulation points inside and outside buildings. To illustrate the flexibility of the Dempster-Dumpster System in handling all types of materials in your plant, we show, at right, a few of the dozens of Dempster-Dumpster Containers built to meet every bulk materials handling need. And remember, one truck-mounted Dempster-Dumpster handles all containers, regardless of capacity or design.

The Dempster-Dumpster System eliminates standing idle time of crews and trucks . . . eliminates re-handling of materials . . . increases efficiency, sanitation and good housekeeping . . . cuts cost of truck equipment and operation tremendously. Without question, it's the most efficient and lowest cost method of bulk materials handling by truck ever devised! The chances are this system will save you thousands of dollars annually. This equipment manufactured and sold exclusively by Dempster Brothers, Inc.



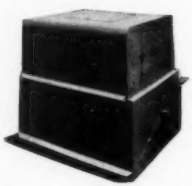
Drop Bottom Container built up to 10 cu. yd. capacity to handle heavy materials.

Tank Type Container meeting A.S.M.E. specifications. Capacities up to 1,200 gallons.

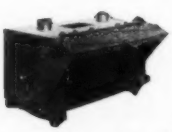


Tilt Type with Converged Lip for handling fine aggregate, wet or fluid materials.

Drop Bottom Pressed Steel Type for lighter service.



Universal Type built up to 12 cu. yd. capacity with top and end doors.



Five cu. yd. container with swivel casters for handling waste blast sand.

WHEN A CONTAINER IS FULL, the Dempster-Dumpster picks it up, hauls to destination and dumps the materials or sets load down intact. These three simple operations, shown above, are hydraulically controlled by driver in truck cab.

DEMPSTER BROTHERS - 162 Shea Building - Knoxville 17, Tennessee

PRESS BREAKDOWNS ENDED BY SUNTAC

NO MORE MANUFACTURING DELAYS. The manufacturer of these bearings uses heavy-duty presses to blank out parts. The problem of press bearing failures due to inadequate oils has been eliminated by changing to Suntac.

CLEAN FLOOR, CLEAN MACHINE. Adhesiveness prevents Suntac Oil from squeezing out of the bearings. Before Suntac was used, floors had to be cleaned constantly to keep them from becoming slippery and dangerous.

A large ball-bearing manufacturer was having trouble with the oil used in some older heavy-duty presses. At frequent intervals the machinery had to be shut down due to bearings overheating. Because the oil would not *stay in*, bearing life averaged only eight months. Each failure took a press off the line for a month or more. Floors had to be cleaned constantly to keep them from becoming slippery and hazardous. Many different oils were tried in an effort to remedy the situation, but none proved adequate for the job, and production suffered.

Finally the company called in a Sun representative for consultation and changed to a Suntac Oil at his suggestion. Results were excellent, and the presses have operated without a bearing failure ever since. The adhesiveness of Suntac prevents it from squeezing out and keeps the bearings running cool. For the same reason the floors around the presses are free from oil-drip. Oil consumption has been cut 50 percent.

If you are having trouble keeping old or worn equipment *on the job*, use the coupon below.

SUN OIL COMPANY, Dept. PY-6 Philadelphia 3, Pa.

We are having bearing failures possibly caused by faulty lubrication.

☐ Please have a Sun representative call.
☐ Send me your booklet "Suntac Oils Case Histories."
☐ Send me your technical bulletin "Lubrication of Industrial Machinery."

Name_____

Title_____

Company_____

Street_____

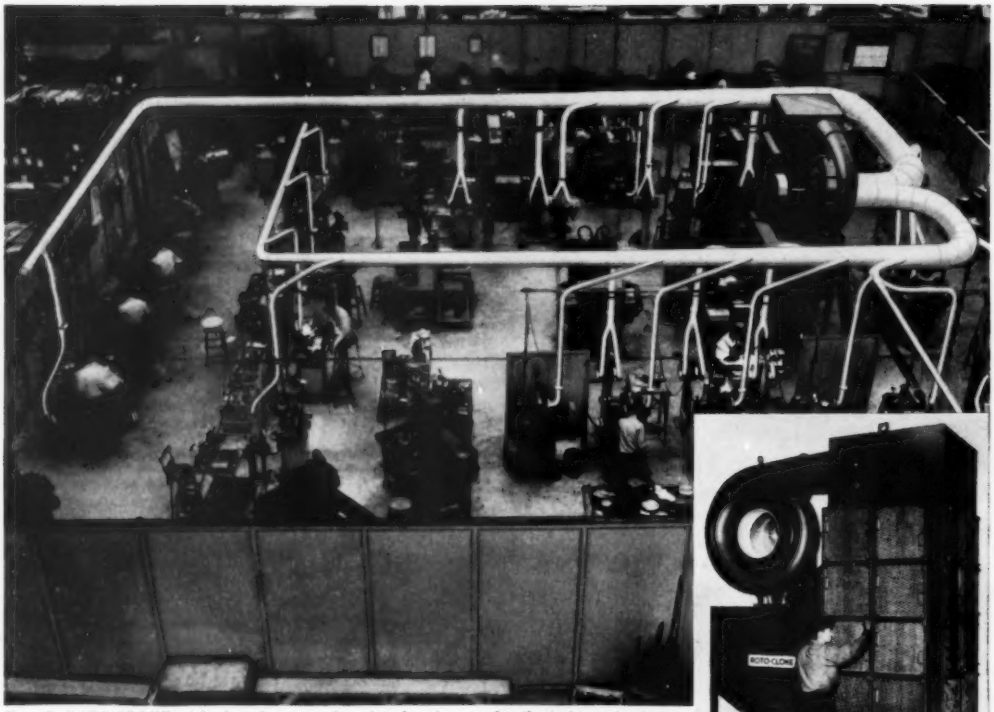
City_____ Zone_____ State_____

TECHNICAL ASSISTANCE AVAILABLE. Sun's engineers are at your service for consultation on lubrication matters. It will pay you to utilize the broad experience they have gained in solving a wide variety of problems in many different industries.

SUN INDUSTRIAL PRODUCTS

SUN OIL COMPANY, PHILADELPHIA 3, PA. • SUN OIL COMPANY, LTD., TORONTO AND MONTREAL

SUNOCO®



Type D ROTO-CLONE with after-cleaners exhausting dust from tool crib air for recirculation

Type D ROTO-CLONE with after-cleaners.

CLEAN AIR from a tool crib ...bird's eye view

Compact AAF ROTO-CLONE Eliminates Dust From Multiple Grinding, Buffing Sources.

Dust dispersion from tool refinishing is no longer a problem for this aircraft manufacturer. Note that a compact and efficient Type D ROTO-CLONE installation with after-cleaners allowed a tool crib location in the very heart of the plant . . . easily accessible to all operations. Dust and dirt were so successfully eliminated from multiple grinding and buffing sources that only low partitions were required and air could be freely recirculated to other work areas.

AAF's Type D ROTO-CLONE is a dynamic dust precipitator which combines the three functions of exhausting, separating and storing dust in one compact, self-contained unit. Widely used in the metal working industries the Type D delivers collection efficiencies between 95 and 98%. However, where it is desirable to recirculate air to work areas, the air leaving the ROTO-CLONE may be passed through an after-cleaner to remove remaining fines. The Type D's compact design is a highly desirable and exclusive feature. It permits location near the dust source, allows dust producing operations to be placed at the most advantageous positions, and permits easy relocation.

Whether your dust problems concern tool refinishing or other metal working operations, obtain full information on the Type D ROTO-CLONE. AAF representatives are as near as your phone . . . in all major cities . . . or write to us for Engineering Bulletin No. 270-E1.

AAF **American Air Filter**
COMPANY, INC.
228 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q. • Pacific Division Office, San Francisco, Cal.

SEE THE INSIDE STORY OF WHY

Dayton V-Belts last for YEARS!

Exclusive Dayton 327-V blend of natural and synthetic rubbers. Blended for tension—stretches easily and returns to original position instantly. Eliminates distortion and heat build-up.

Every cord has thousands of continuous filaments of high-tenacity rayon! And the complete surface of each cord is fully rubber coated by Dayton's new *Thoro-Bonding* process. Result: high resistance to fatigue . . . great flexibility . . . high tensile strength!

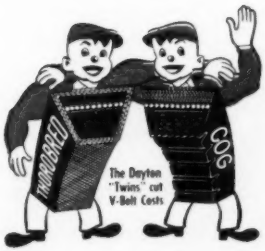
Special compound (812-V) for compression section of belt only. Compresses with minimum "prodding"* of cords during flexing—maintains crosswise rigidity.

*The upward thrust of the compression section against the cords.

All-weather, rubber impregnated cover, made of costly, "Hi-Twist" fabric, for better flexing, longer wear. Proper bias angle maintained at all times for easy flexing.

Find out how much money this better belt can save you!

Ask your Dayton Distributor to give you the complete Inside Story of Dayton Thorobred Belts. His complete line of belts solves every drive problem! You'll find his name listed under "Belting" in your telephone directory.
Dayton Rubber Company, Dayton 1, Ohio.



Dayton Rubber

Since 1905
WORLD'S LARGEST MANUFACTURER OF V-BELTS

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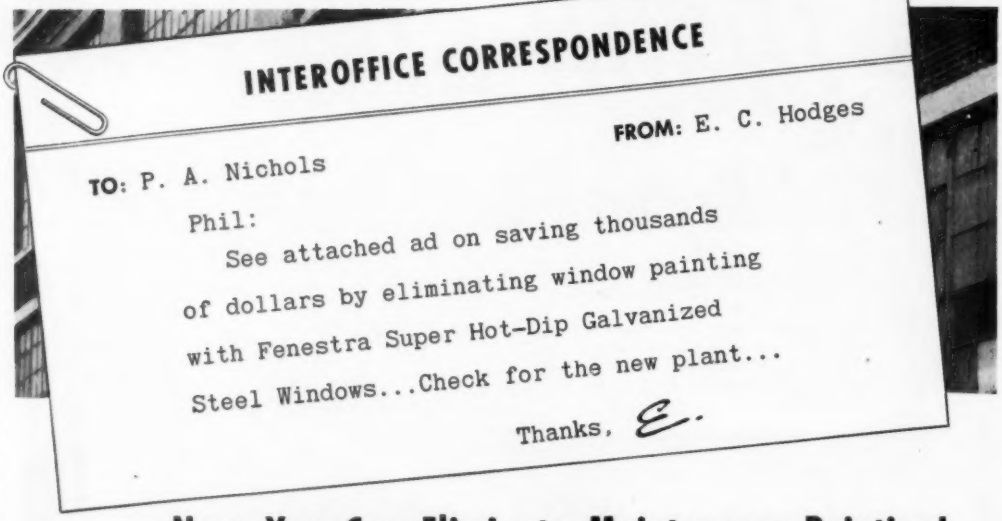
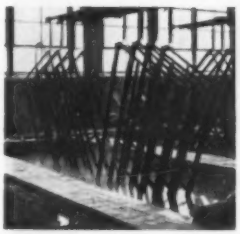
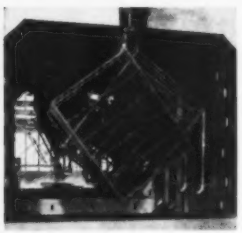

INTEROFFICE CORRESPONDENCE
FROM: E. C. Hodges
TO: P. A. Nichols
Phil:
See attached ad on saving thousands
of dollars by eliminating window painting
with Fenestra Super Hot-Dip Galvanized
Steel Windows...Check for the new plant...
Thanks, E.

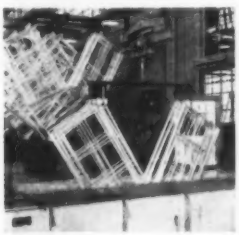
Now You Can Eliminate Maintenance Painting!



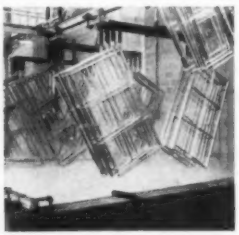
FLUXING. After cleaning, pickling and rinsing, Fenestra Windows dip into a flux bath that provides a film to prevent contamination of the cleaned steel as it passes to galvanizing tank.



DRYING. In this oven, the flux is dried on. Of course, in the galvanizing tank, this protective coat of flux volatilizes on contact with the molten zinc to permit a strong zinc-iron bond.



GALVANIZING. Assemblies dip deep into molten zinc, and come up with a heavy, smooth, uniform coating. Temperature and timing are automatically controlled with laboratory accuracy.



BONDERIZING. Here you see the galvanized assemblies being Bonderized to give the surface a soft silver color and to provide a holding surface for decorative paint, if it is ever desired.

Here's why it will pay you to check, too:

A window painting bill for a typical plant can run around $3,000 every few years.

The most practical answer to that—and any other window problem—is Fenestra* Super Hot-Dip Galvanized Steel Windows. They are rugged, rigid—and completely protected from rust.

Here's why they are called *Super* Galvanized: Fenestra has developed a Hot-Dip Galvanizing system designed specifically for steel windows, and has built a special plant around it. It is the only one of its kind in America.

Completely automatic controls move Fenestra window assemblies through a series of special tanks where they are cleaned and pickled, rinsed, fluxed, dried, galvanized and Bonderized. Every step is laboratory controlled.

So add Super Hot-Dip Galvanizing to other Fenestra advantages . . . such as integral ventilator butts that increase window strength, precision machining of window bars for perfectly uniform window size, automatic assembly of ventilators for perfect fit, continuous double contact for weather tightness all around vent openings, rigid *interlocking* muntin joints.

And, remember, Fenestra's volume production, permitted by standardization of types and sizes, keeps the cost of Fenestra Windows low.

Call your Fenestra Representative or write Detroit Steel Products Company, Dept. PE-6, 2280 East Grand Boulevard, Detroit 11, Mich.

*Ⓡ

Fenestra SUPER HOT-DIP GALVANIZED STEEL WINDOWS

from America's first plant especially designed to galvanize steel windows

"DEAD STORAGE" AREA AT NIGHT . . . . TRANSFORMED INTO ACTIVE MARSHALING YARD BY G-E LIGHTING

Small investment in G-E lighting doubles value of outdoor work areas

A LIGHT FOR EVERY NEED is available from G.E.'s full line, for example: **A** High efficiency, lightweight, easy-to-install area floodlight for crossarm mounting, with three beam spreads; **B** Heavy-duty, wide variety of mountings and beam spreads; **C** Inexpensive, open floodlight for closer-range illumination.

You can use your plant's outdoor areas just as efficiently at night as you do during the day by adding outdoor lighting. And the cost of this productive lighting is insignificant compared to your present investment in outdoor work areas.

SPEED UP MATERIALS HANDLING

Tighter production schedules, congested plant facilities, and many other factors make it necessary for you to handle raw materials, parts, and products at night. With 'round-the-clock "daytime" provided by G-E outdoor lighting, fast, efficient materials handling is made possible, with a minimum of mistakes or damage. In the plant pictured you can see how an area, almost useless in the dark, became a productive asset.

PROTECT PERSONNEL, PLANT PROPERTY

The right outdoor lighting can pay big dividends in preventing accidents, pilfering and sabotage. But it is important to get lighting that serves your needs best—money spent on inadequate lighting is often wasted. To get more information on General Electric's full line of outdoor lighting for industrial plants, write for bulletin GEA-3640, to *Section 451-172, General Electric Company, Schenectady 5, N. Y.*

OUTDOOR INDUSTRIAL LIGHTING

GENERAL ELECTRIC

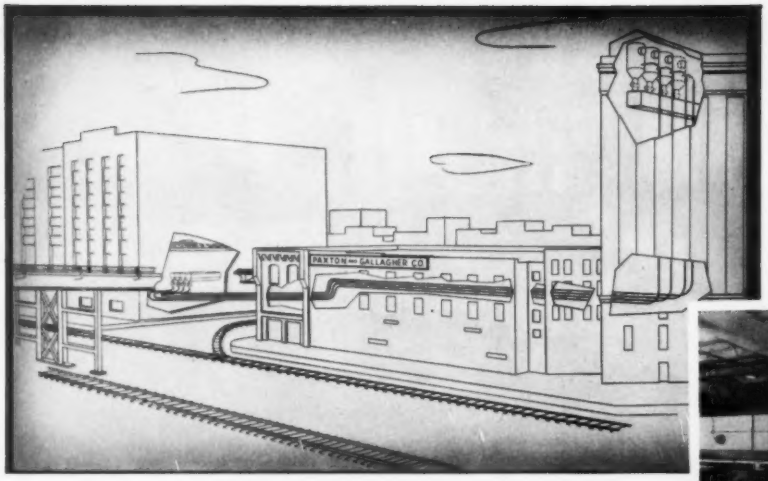


Diagram showing location of Dracco conveyor installation at Paxton and Gallagher Co., Omaha, Neb., which carries coffee from storage bins, over a rail siding and under a vehicle bridge, through three buildings and up to the receivers and roasters on the ninth floor of the final process building.

Imagine trying to do this ANY OTHER WAY!

THE CUSTOMER PROBLEM—To improve the slow and costly method of handling bulk coffee beans over a route that included (1) a four-floor elevator drop to a siding, (2) a hundred-yard rail haul, and (3) a nine-floor elevator lift to final processing equipment. The work included two loading and two unloading operations.

THE DRACCO ANSWER—A Dracco Pneumatic Conveyor now transports the coffee *automatically* at 36 tons per hour! It is carried through a completely enclosed sanitary system directly from the storage floor to the final processing machines.

THE RESULT—Slow manual and mechanical materials handling was eliminated, plant capacity was substantially increased, and operating costs were reduced to a minimum.

This cost-saving materials handling installation is typical of the modern technique of handling dry bulk materials with Dracco Pneumatic Conveyors.

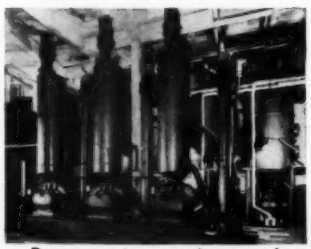
DRACCO CORPORATION

Harvard Avenue and East 116th St. • Cleveland 5, Ohio

Further information on the advantages of Dracco Pneumatic Conveyor as related to your materials handling problem may be had by contacting the nearest Dracco representative or Dept. P-6, Cleveland, Ohio.

Surge hoppers receive coffee beans from blenders. Coffee is automatically fed from these hoppers into the conveyor system.

Trestle between buildings supporting conveyor pipes over rail siding and under vehicle bridge.



Dracco system receivers and vacuum pumps on the ninth floor of the final process building. Each of the pumps creates the vacuum used to transport 12 tons of coffee beans per hour.

DRACCO *Performance Proved*

DUST CONTROL EQUIPMENT • PNEUMATIC CONVEYORS

"Tycol Anorustols prevent rust... protect all metals... clean off easily"

That's true! Tycol Anorustols form protective coatings—keep moisture and oxygen from attacking metal surfaces. They are easily applied by swab, dip or spray. Various consistencies and types of Anorustols are available to meet every condition where "rust protection" is needed.

For complete information about Tycol "rust protection" phone or write your nearest Tide Water Associated office today.

TYCOL

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Boston • Charlotte, N. C. • Pittsburgh
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TIDE WATER ASSOCIATED OIL COMPANY

17 BATTERY PLACE · NEW YORK 4, N.Y.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"

LIGHT COSTS for HEAVY LOADS

up to 15 tons

Where your service requirements do not demand a P&H Heavy-Duty Crane, a Trav-Lift is the sensible answer. They're available in capacities up to 15 tons with various spans and lifting speeds — with floor or cage control.

P&H Trav-Lift Cranes are always tailored to fit your specific needs — with the same safety factors as a heavy-duty crane. Standard, cost-saving designs, combined with many quality features, make the Trav-Lift a modest investment that will pay you big dividends for years to come.

Ask a P&H materials handling engineer to analyze your requirements.

Handle it "thru-the-air" at lower cost.

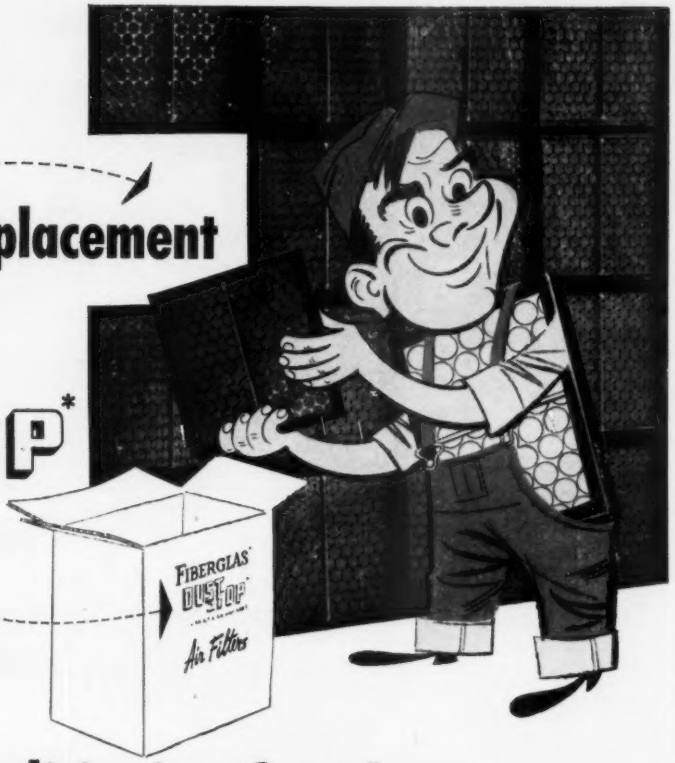
P&H OVERHEAD CRANE DIVISION

HARNISCHFEGER CORPORATION

4682 West National Avenue • Milwaukee 46, Wisconsin

Power Shovels • Crawler and Truck Cranes • Overhead Cranes
Hoists • Arc Welders and Electrodes • Soil Stabilizers
Diesel Engines • Pre-Fabricated Homes

Systematic replacement with DUST-STOP* AIR FILTERS



Cuts Air Conditioning Costs!

Regular servicing of your air conditioning equipment—by a competent outside service or your own men—is the first essential of air conditioning economy.

The second essential is the choice of filters for your unit. Fiberglas DUST-STOP* Air Filters, backed by years of research, have been designed to provide an optimum balance of efficiency and long life. This balance is achieved by two things: one, a special nondrying adhesive that retains its efficiency over a wide variety of operating temperatures and, two, a fiber diameter that is not so fine that it causes face loading—not so coarse that it allows poor filtering. DUST-STOP Filters trap virtually all dirt yet let air flow freely.

Systematic replacement of DUST-STOP Filters assures lowest operating cost—top cooling performance.

Save money on filters. The "Comparative Study of Air Filtering Costs" helps you figure your costs to the penny. Get a copy from your local filter supplier or Fiberglas Branch Office. Or mail coupon.

OWENS-CORNING FIBERGLAS

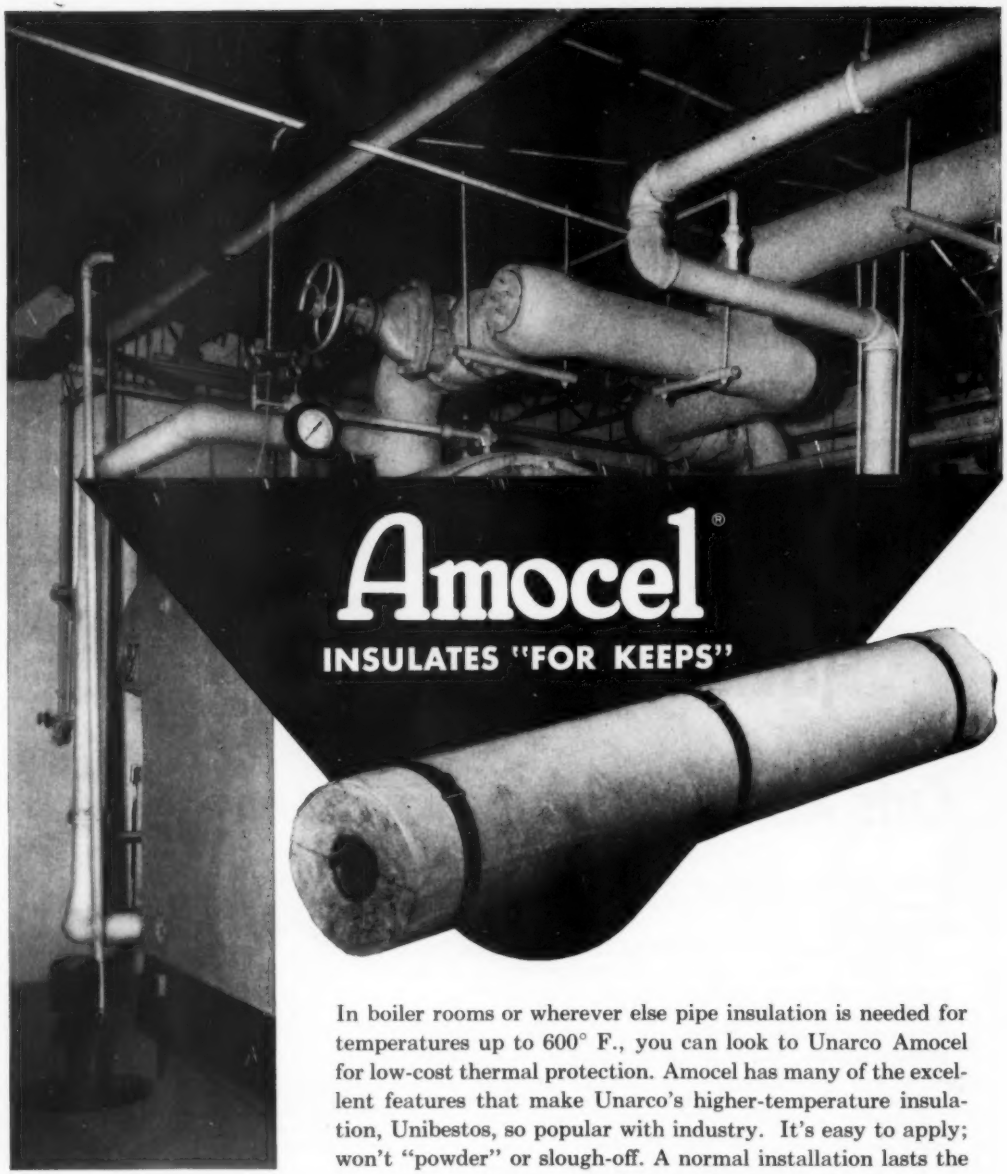
DUST-STOP* AIR FILTERS

*FIBERGLAS and DUST-STOP are trade-marks (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation for a variety of products made of or with fibers of glass.

Owens-Corning Fiberglas Corporation
Dept. 95-F
Toledo 1, Ohio

Gentlemen: Please send me a copy of your "Comparative Study of Air Filtering Costs in Central Systems".

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

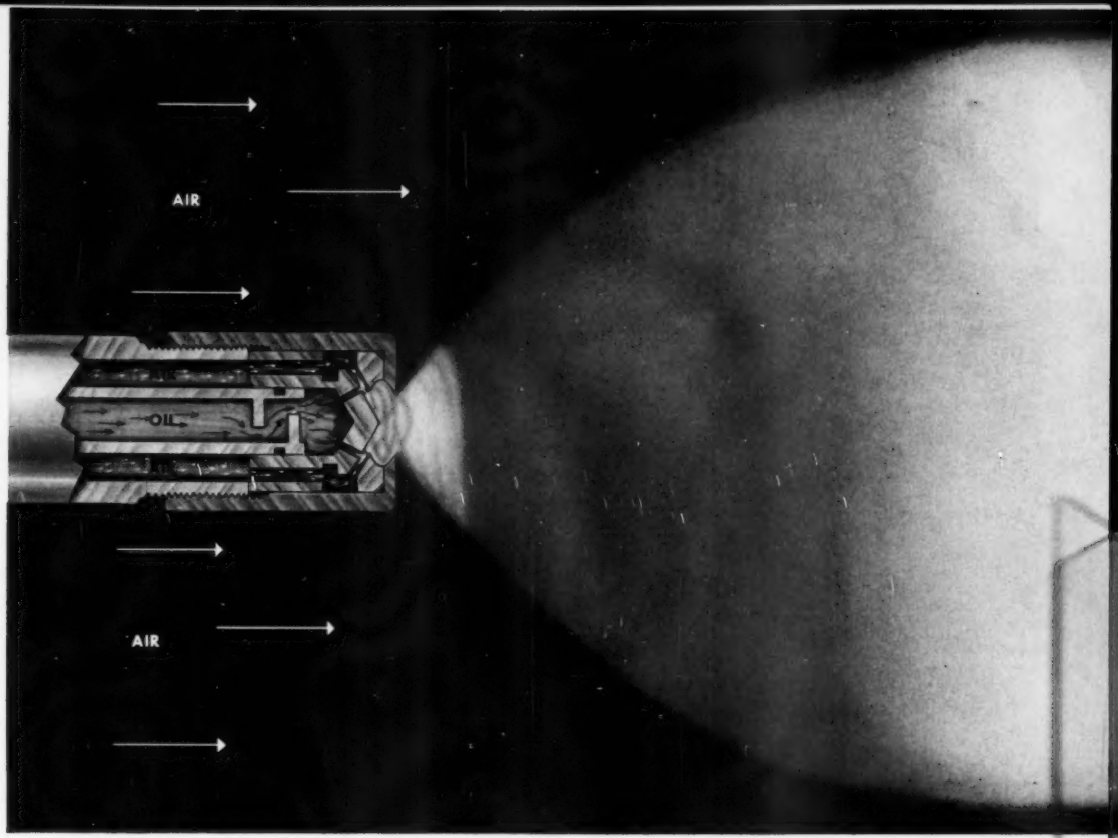


In boiler rooms or wherever else pipe insulation is needed for temperatures up to 600° F., you can look to Unarco Amocel for low-cost thermal protection. Amocel has many of the excellent features that make Unarco's higher-temperature insulation, Unibestos, so popular with industry. It's easy to apply; won't "powder" or slough-off. A normal installation lasts the lifetime of equipment or building. Phone your nearby Unarco Warehousing Distributor for Amocel from stock. Or write us for your Distributor's name and free copy of Bulletin 76-109.

UNARCO

UNION ASBESTOS & RUBBER COMPANY

Dept.J-6, 332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS



NOW—only Powermaster gives you VORIFLOW combustion!

LATEST DEVELOPMENT IN BURNER DESIGN REDUCES COSTS AND INCREASES BOILER EFFICIENCY

Here's what *Powermaster's* new VORIFLOW burner will do for you:

1. Saves fuel by providing infinitely variable combustion modulation in response to demand—with *full efficiency*—through wide range from 30% to 100% of firing capacity.

This means elimination of waste and maintenance headaches because of incomplete combustion. With the exclusive design of the VORIFLOW burner, tiny jets of compressed air pulverize every droplet of oil . . . projecting a fine fog of oil/air emulsion into the combustion area where it ignites and burns —immediately and completely. The VORIFLOW burner does away with outmoded mechanical spinning devices, globules of wasted oil, and gummy cleaning problems.

2. Slashes boiler maintenance costs.

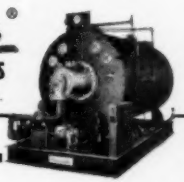
There are *no* moving parts to wear out • There is *no* cup to clean daily. Routine cleaning of the burner once a month is sufficient • There is *no* burner vibration to throw adjustments "out of whack" • Parts are made of stainless steel, brass, and beryllium copper—they will last *indefinitely*.

3. The combination burner permits rapid change-over from one fuel to another—light oil, heavy oil, or gas.

And when we say "rapid" we mean just that—the job can be done in four minutes. Modulating firing controls are ready to go into action at the flick of a switch. It isn't necessary to change the entire burner assembly. All you need to do to fire gas is to remove the oil nozzle.

Before deciding on a boiler for your plant, be sure to get the facts on the newest POWERMASTER with VORIFLOW combustion. Write for this catalog that gives you the entire story of the *Powermaster* packaged automatic boiler. Just drop us a line and we'll put one in the mail for you.

Powermaster®
PACKAGED AUTOMATIC BOILERS
In sizes to 500 HP; pressures to 250 psi.



ORR & SEMBOWER, INC. • Established 1885 • **1000 Morgantown Road, Reading, Pennsylvania**

Plant Operating Men find these
MICRO "BAFI" Precision Switches

ideal limits, safeties and interlocks where high current capacity is a "must"

These MICRO "BAFI" precision switches combine long life and reliability with the capacity to make and break steady state currents of 20 amperes and to handle inrush currents as high as 75 amperes.

The rugged, die cast, aluminum enclosures protect the basic switching element against mechanical damage from vibration or shock and are sealed against the entrance of dust, dirt, oil or moisture.

The overtravel mechanism is built into the metal enclosure. This assures accurate repeatability of the operating point throughout the long switch life.

To provide plant engineers with the utmost versatility of mounting and actuation, these MICRO "BAFI" switches are provided with pin-plunger, roller-plunger, and roller-arm actuators and are available for either right or left hand mounting.

For complete information on the characteristics and electrical ratings of these MICRO products, consult the MICRO SWITCH distributor in your community. These distributors are located in 127 cities to assist you in your plant switching problems. Look under "Switches, Electric" in your classified phone book.

Write for your copy of "MICRO TIPS" today

It's full of practical ideas. "MICRO TIPS" will be mailed to you regularly on request.

MICRO MS SWITCH

FREEPORT, ILLINOIS

MICRO Snap-Action Switches . . . Honeywell Mercury Switches

A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

STOP DOWNTIME...

Cut Handling Costs!

The Gould "Thirty"—
America's Finest
Industrial Truck Battery

It costs real money when a truck goes out of service because of battery failure. There are two sure ways to keep materials moving, men and machines working: 1. Power your trucks with Gould Industrial Batteries; 2. Maintain all your batteries, regardless of make, with the Gould Plus-Performance Plan. This *free* system of preventive maintenance is making money for hundreds of industrial firms by helping them keep their batteries new, longer.

It will pay to learn more about Gould Industrial Truck Batteries and the Gould Plus-Performance Plan. Write Gould Battery Information Headquarters for full information.

GOULD
Industrial Batteries

GOULD-NATIONAL BATTERIES, Inc., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

TEST EQUIPMENT by WESTON

for ALL electronic and electrical maintenance needs!

Mutual Conductance ELECTRONIC TUBE ANALYZER

(Model 686) an "all purpose" tube analyzer that tests tubes under exact operating potentials. Accurately determines true mutual conductance of all tubes both in accordance with manufacturer's rated operating conditions, as well as at other values for non-standard applications.

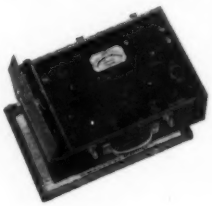
High Frequency ELECTRONIC ANALYZER (Model 769)

three instruments in one: a Volt-Ohm-Milliammeter with self-contained power source—a high impedence electronic Volt-Ohmmeter using 115 volt 60 cycle power—a stable, probe type Vacuum Tube Voltmeter for use to 300 megacycles.

Multi-Purpose CIRCUIT TESTER

(Model 785) a versatile, portable tester for laboratory or maintenance needs, where an ultra-sensitive instrument is required. Provides 28 A-C and D-C voltage, A-C and D-C current, and resistance ranges. (D-C sensitivity 20,000 Ohms per volt.)

Mutual Conductance PORTABLE TUBE CHECKER



(Model 798) for general testing of all receiving tubes, voltage regulator tubes and low power thyratron tubes. Provides proportional mutual conductance ranges 3000/6000/12000 micromhos. Compactness and light weight make it ideal for all servicing requirements.

All WESTON Test Equipment is specifically designed to provide time-saving facility and increased efficiency for all electronic or electrical maintenance jobs. For complete information on all equipment in this broad line, consult your nearest WESTON representative, or write for Test Equipment Bulletins . . . **WESTON** Electrical Instrument Corporation, 617 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAG Instruments.

WESTON *Instruments*

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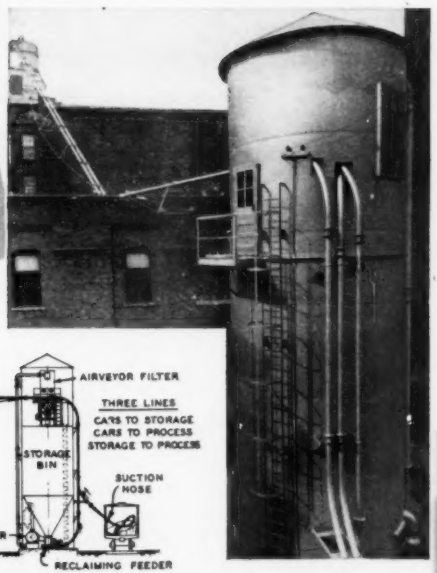
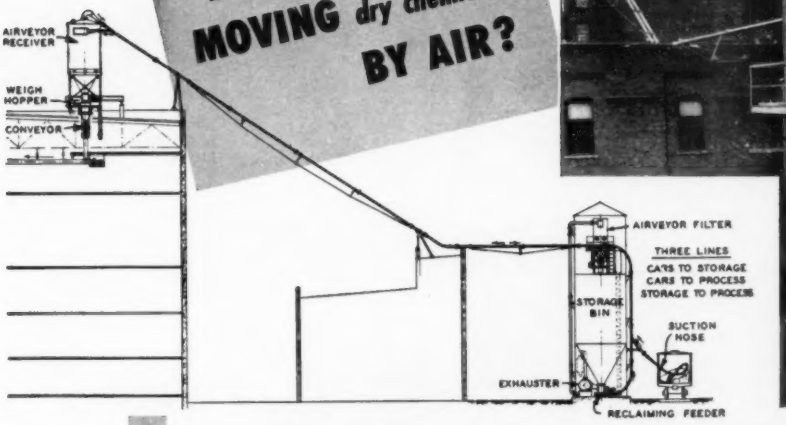
have you ever considered MOVING dry chemicals BY AIR?





it's cheaper—safer—more efficient

The AIRVEYOR®

Moving air has great carrying ability. When it's controlled, air supports and transports dry granular or pulverized materials at high speed to any predetermined point.

For example—a leading soap manufacturer, using the Airveyor, has found the savings quickly pay for this better method of handling light soda ash. Unloading, conveying to, and reclaiming from storage for delivery to process in the plant, is accomplished quickly and with a minimum of labor. The Airveyor requires the attention of only one man. Important from the safety angle is the fact that dusting has been eliminated. Few moving parts assure reduced maintenance.

Note the compact, simple layout of the system illustrated . . . the storage bin located alongside of the railroad track, with the Airveyor filter directly above, and the exhauster below the bin, all within the same structure.

The Airveyor in this plant unloads from cars to storage and reclaims from storage for delivery to process. The system is so arranged that material can also be conveyed direct from cars to process if desired. Longest conveying distance—200 feet.

Why not investigate the possibilities of this flexible system of handling chemicals in your plant? Airveyors handle a wide range of dry pulverized and granular ingredients—safely, cleanly, economically, speedily and efficiently. Without obligation, a Fuller engineer will analyze your present conveying system and show you how the Airveyor can help in your operations.

Fuller

DRY MATERIAL CONVEYING SYSTEMS AND COOLERS—COMPRESSORS AND VACUUM PUMPS—FEEDERS, AND ASSOCIATED EQUIPMENT

FULLER COMPANY
Catasauqua, Pennsylvania
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

A-126

YOU GET ALL YOU PAY FOR with...

Wayne

JOB-ENGINEERED, GUARANTEED OUTPUT IN EVERY WAYNE COMPRESSOR

Every Wayne Air Compressor is sold on the basis of known efficiency in terms of *useable air output.* Designed, engineered and built in Wayne plants, each compressor is an exclusive Wayne product. Because it is "job-engineered", you are assured of buying guaranteed air output for a specific job.

Wayne Compressors are checked for volumetric efficiency, performance and operating tolerances. Inspection standards are high, and units must measure up to rigid requirements in every case. Every working part has been designed for minimum maintenance and low operating cost. This quality control gives you a better compressor. The performance guarantee lets you select it according to actual useable air output required.

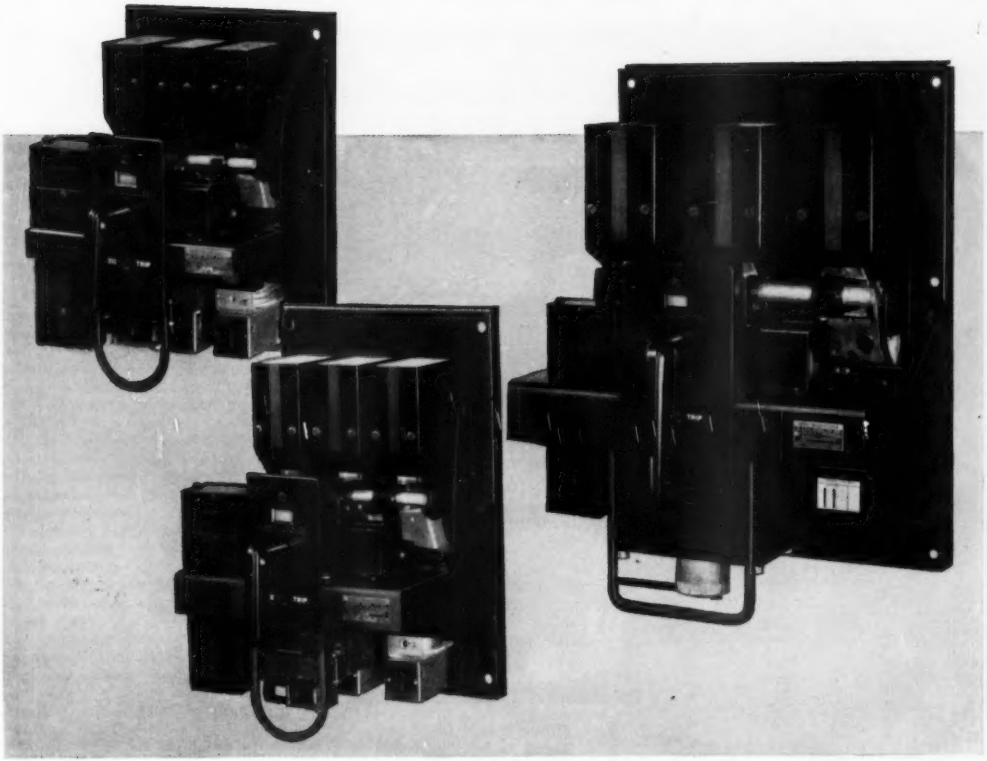
You get every dollar's worth of air output when you buy Wayne. Also important, every compressor is backed by a nationwide service organization. Make your next compressor Wayne!

ENGINEERED 10 WAYS BETTER!

1. Larger aircooling flywheel
2. Extra cooling fins on cylinder blocks
3. Easily cleaned intercooler
4. Dual intake valves
5. Positive lubrication system
6. Dual moisture extractors
7. Counter-balanced flywheel . . . smoother operation
8. Automotive type pistons . . . less heating
9. Accessible drain-sock assures easy moisture removal from tank
10. Easy to clean filter and muffler

THE WAYNE PUMP COMPANY

SALISBURY, MARYLAND



Here's the most *FLEXIBLE* low-voltage circuit protection available today

Flexible in operation because every Westinghouse DB Circuit Breaker features an adjustable overcurrent tripping device which provides, in a single unit, combinations of delay and instantaneous characteristics for many applications.

Flexible in application because in the complete line of Westinghouse DB Breakers there's a rating for every interrupting duty . . . 15,000, 25,000 and 50,000 amperes. All units are uniform in appearance and performance.

Flexible in design because the breakers in each rating are built with completely interchangeable subassemblies to permit simple addition of auxiliary attachments and to simplify maintenance.

Booklets B-4067 on the DB-15 and DB-25, and B-4740 on the DB-50 contain additional information. For copies, call your Westinghouse representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-60785

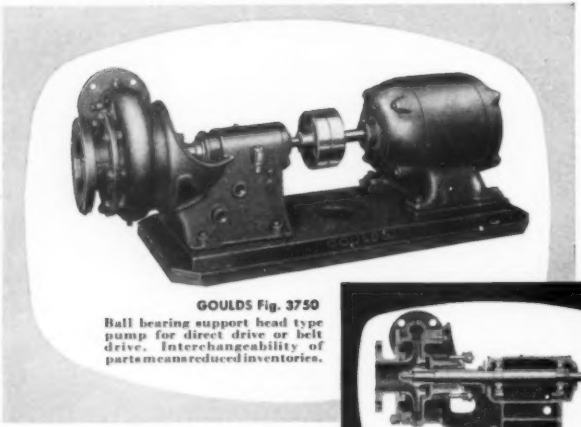
YOU CAN BE SURE...IF IT'S
Westinghouse

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

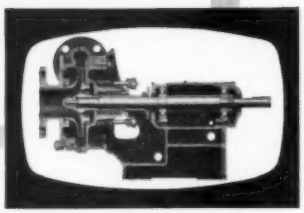
"DE-ION" CIRCUIT BREAKERS
TYPE DB

A versatile performer . . .

Goulds "SUPPORT-HEAD" CENTRIFUGAL PUMP



GOULDS Fig. 3750
Ball bearing support head type pump for direct drive or belt drive. Interchangeability of parts means reduced inventories.

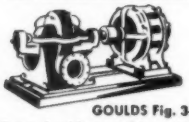


Here's a pump that's ready to go to work, handling any one of a dozen jobs . . . Goulds "Support-Head" Centrifugal Fig. 3750. For example, you can use it for general industrial pumping, booster service, water supply systems, liquid circulation, and air conditioning service.

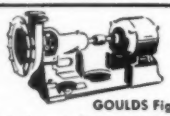
It is giving hundreds of plants in a variety of industries, long trouble-free service. Its extra heavy, well proportioned construction minimizes pump maintenance. Full open-top design provides ready access to gland and stuffing box . . . a particularly important feature in inaccessible locations. Goulds "Support-Head" Centrifugal pumps are available with capacities up to 3800 G.P.M. Heads up to 400 ft.

Full details in Bulletin 715.1. Ask for your copy today.

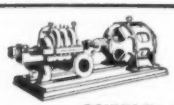
Other Sturdy GOULDS for Industrial Service



GOULDS Fig. 3450
These double-suction, single-stage centrifugal pumps will handle up to 15,000 G.P.M. Heads up to 500 ft. Bulletin 721.2.



GOULDS Fig. 3705
Stainless steel pumps for handling acid and alkaline liquors. Capacities up to 600 G.P.M. Heads up to 160 ft. Bulletin 725.3.



GOULDS Fig. 3330
Multi-stage centrifugal pumps for boiler feed and pressure service. Capacities 40 to 2000 G.P.M. Heads to 850 ft. Bulletin 722.1.

MEMBER HYDRAULIC INSTITUTE USA

Goulds PUMPS INC.
Seneca Falls
New York

NEW PRODUCTS

(Begins on page 120)

provided to protect the basic switch against damage and the cover is sealed to keep out dirt and moisture. These are single-pole, double throw switches. *Micro Switch.*

Ask for Item 8

1000-W LAMP for large area, high mounting applications

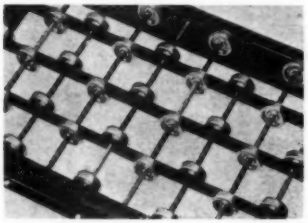
To meet a trend toward larger manufacturing spaces, and higher mountings and lighting levels, both indoors and outdoors, this company offers the 1000-w C-H12 Fluorescent Mercury Lamp. Similar to a previously announced 400-w lamp, this new light source is said to provide a golden white light suitable for all types of lighting service except those where close color discrimination is involved. Its bulb has an isothermal shape designed to allow the phosphor coating to function at top efficiency.

When activated by invisible ultraviolet light from the quartz arc, the phosphor gives off red light and this blends with the blue-green-white light from the mercury arc to give a golden white light with about the same color quality as a mixture of equal wattages of mercury and incandescent light. Inside frosting of the bulb provides better diffusion of light and more uniformity of color. When used outdoors, fixtures should be designed to protect bulb from rain or insects. *Lamp Div., Westinghouse Electric Corp.*

Ask for Item 9

GRAVITY WHEEL CONVEYOR offers increased load capacity

The Industrial Rapid-Wheel Conveyor has 3½-in. deep channel frames of 12-gage steel for strength and rigidity, and each lane of wheels is reinforced with a steel center band which supports the axles at the point of great-



est strain. These construction features are designed to permit distributed loads of up to a ton to be handled on a 5-ft section. According to manufacturer, this heavy-duty wheel conveyor can be used in place of bulkier and more expensive conveyor types in many installations.

The conveyor comes in 5- and 10-ft sections 12 and 18 in. wide, and in 45- and 90-deg curves. It is available

RIGHT IN YOUR OWN BACK YARD... BY WEST

TO HEAR DIEHARD TELL IT, NO INSECTICIDE COULD DO THE JOB IN HIS PLANT··· UNTIL··· YOU GUESSED IT··· HE TRIED "DOUBLE PENETRATION!"
SNA-FOOD KOMPANY
HEY, BOSS, HAVEN'T FOUND A TRACE OF WILD LIFE SINCE LAST WEEKS FOGGING WITH VAPOSECTOR!
H'MM! I'M BUGS, IF VAPOSECTOR DOESN'T DO THE TRICK!
WHY TEAR UP THE FLOORBOARDS? I CAN'T EVEN HEAR A FADING HEART-BEAT!
HERE'S THE COST SHEET, BOSS-- 12,000 CUBIC FT. HERE··· SO IT ONLY COST US A BUCK TO FOG THIS WHOLE DEPARTMENT WITH OUR WEST ATOMIZERS!
REMEMBER THE FIRST VAPOSECTOR DEMONSTRATION? IT POSITIVELY RAINED INSECTS!
I WAS ITCHING TO TELL YOU THAT!
THEM'S NOT BUGS··· THEY'RE POPPY SEEDS FROM SOMEBODY'S LUNCH-BOX
NO SMELL, NO STAIN, NO AFTERTASTE··· VAPOSECTOR QUALIFIES HERE, CHIEF!

DIEHARD'S CASE ISN'T SO UNUSUAL AFTER ALL! In all types of industry West representatives hear comments like "our situation is a special one" . . . "an insecticide is bound to impair the quality of our product" . . . and – stranger still – "we don't have any insect problem here!"

VAPOSECTOR was formulated for the realist who *has* an insect problem and wants to get rid of it – fast! It's fully three times as concentrated as the standard Grade AA spray . . . yet there's no danger of contamination or odor when used according to directions. Vaposector controls insects by "double penetration". When used with West spraying equipment, it becomes a "dry fog" that *penetrates* the most remote crevice . . . then *penetrates* the insect's outer covering for a permanent kill. There's no place to hide. No time to escape. A Vaposector demonstration has often revealed dead insects in numbers never thought possible – simply because they live and multiply in unseen cracks and crevices.

VAPOSECTOR gives more positive control value per gallon than any competitive product. It breaks down into such minute droplets when atomized with specially-designed West equipment, that only one ounce is needed to control flying insects in 1000 cubic feet . . . only two ounces for crawling insects. Compare it with an ordinary mill spray and you'll find Vaposector is over *four times as economical in use!* West can supply Vaposector as well as special mill sprays and fumigants . . . residual and contact insecticides . . . spraying equipment – a *complete insect control program* tailored to your exact needs!

WEST DISINFECTING Company

42-16 West Street
Long Island City 1, N. Y.

ASK FOR FURTHER INFORMATION ON HOW TO CONTROL INSECTS BY "DOUBLE-PENETRATION"

Dept. 52

☐ Please send Vaposector booklet.

Please send information on specially-designed permanent ☐, portable ☐, hand spraying ☐ equipment

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

PRINTWEIGH STOPS *Human Errors*
in reading, remembering and recording your weights

Every time you weigh, material becomes money! Weigh it on Toledo Printweigh Scales and KNOW your *weights and records* are *right*—every time!

Printweigh stops errors . . . provides *printed* weight records . . . assures you that the accurate indication of the Toledo dial will reach your accounting records without chance of human error. Start your cost records with Printweigh accuracy. Available in all Toledo Dial capacities—write for information today—bulletin 2021. Toledo Scale Company, Toledo 1, Ohio.

TOLEDO®
HEADQUARTERS FOR SCALES

NEW PRODUCTS

(Begins on page 120)

with tubular or channel-type guard rails, or may be used without rails for wide materials. Specifications, prices available. *The Rapids-Standard Co., Inc.*

Ask for Item 10

FORK-LIFTS are gasoline- or diesel-engine powered

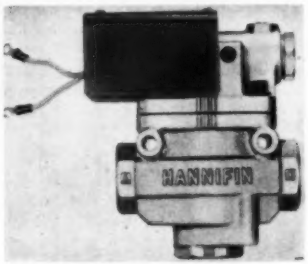
Rated at 3000-lb capacity with a 15-in. load center, these new models supplement company's line of fork lift trucks. The Model FT30-15 is powered by a four-cylinder 49 hp gasoline engine, and the Model FTD30-15 is powered by a diesel engine of identical cubic inch displacement, bore, stroke and mounting dimensions.

Both models have removable wet sleeve type cylinder liners for lower maintenance cost, quick-change 11-in. industrial type clutch; single lever gear shift mounted on steering columns, and center point steering. They're available in five standard masts with 72- to 120-in. lifts. *The Buda Co.*

Ask for Item 11

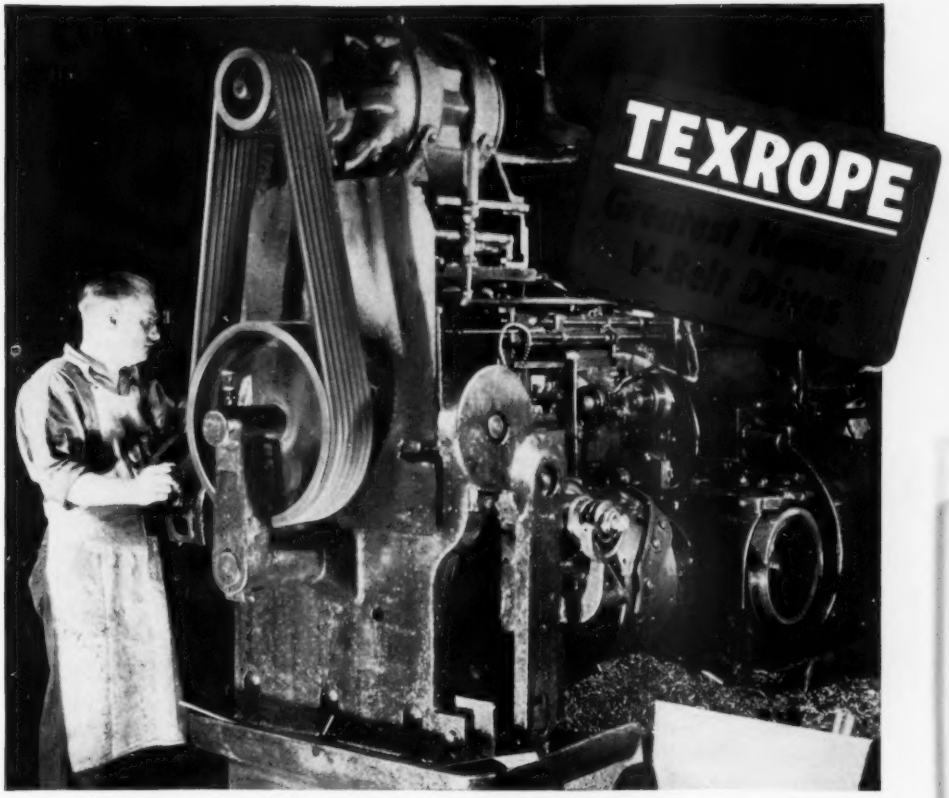
AIR CONTROL VALVE features versatility, low maintenance

The Pilot-Master Valve for directional control of air pressure is designed for both versatility and the simplicity which makes for reduced maintenance. The main or "master" portion can be



operated either two-way or three-way, normally open to pressure or closed to pressure, without internal change, because inlet and exhaust ports are interchangeable. The main valve is pressure operated through a piston-operated poppet. It is springless, and the piston-poppet assembly (only moving part of main valve) fits in a removable cartridge which acts both as cylinder for the piston and upper seat for the poppet. Only two sizes of cartridge-and-piston-poppet assemblies are needed to service all five main valve bodies from $\frac{3}{8}$ through $1\frac{1}{4}$ in.

Also, only one size of pilot head fits all five sizes of master valve. Within this head is three-way solenoid-operated pilot valve which controls main valve by introducing pressure into or exhausting it from the chamber above the piston. *Hannifin Corp.*



Check These 2 Ways to Cut Drive Costs

TEXROPE V-Belt Drives with low cost 1800 rpm motors will often do work of expensive motors and control.

For example you can:

1. Provide slow speed (such as 450 rpm) at the driven shaft using a standard 1800 rpm motor. A standard 4 to 1 *Texrope* drive will do it. And the savings over a 450 rpm cage motor, direct connected are:
   - 600 pounds weight (in 15 hp size).
   - About $200 in cost.
   - About 8% increase in efficiency.
2. Use *Vari-Pitch* sheaves on a *Texrope* drive and provide smooth, stepless speed adjustment. There's no need for a high cost special motor or electric control to provide up to 2 to 1 speed range.

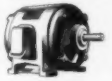
For help on your drive problem, whatever it may be, call your nearby Allis-Chalmers distributor or district office, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3734

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Distributors, Certified Service Shops and Sales Offices throughout the country.



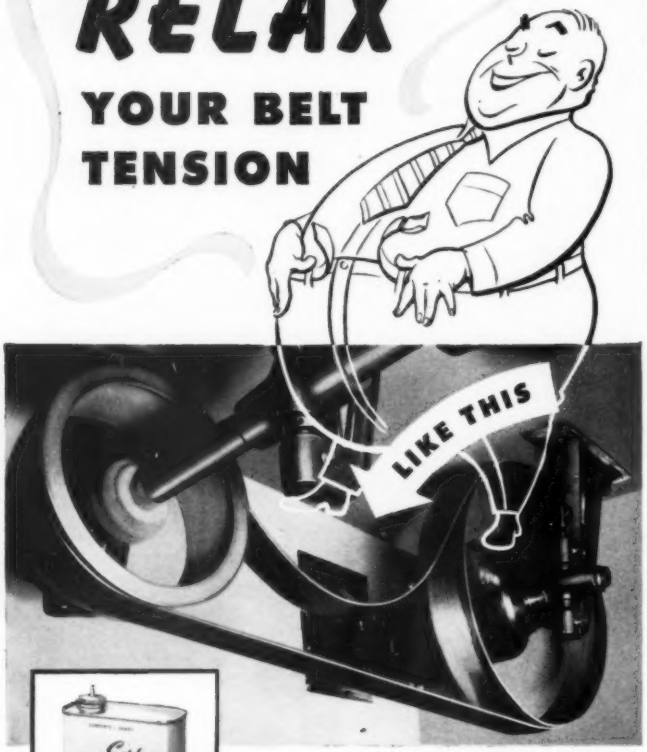
MOTORS — ½ to 25,000 hp and up. All types

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge and up.

ALLIS-CHALMERS

RELAX
YOUR BELT TENSION



CLING-SURFACE

MAKES BELTS
1. WORK BETTER
2. LAST LONGER
3. SAVE POWER

Stop running your transmission belts *tight!* Belts run under high tension, stretch and constantly require "take-ups" which cause costly down time. They increase the friction load, waste up to 50% of your power and place needless strain on bearings and shafting.

By merely applying Cling-Surface to your belts, you greatly increase their "grip" and by relaxing the tension, you actually *increase* the surface areas the belts "cling" to. This "slack belt" operation practically eliminates belt repairs, makes belts, bearings and shafting last longer and delivers MORE POWER to your machines.

The ONLY belt preservative in existence that has passed U.S. Government requirements, Cling-Surface is also the ONLY brand that DARES to recommend this economical, trouble-free, "slack belt" way to end belt worries. A trial will convince you! Sold on MONEY BACK GUARANTEE since 1896. Ask your mill supply man or,

SEND FOR THIS FREE BOOK
"THE TRUTH ABOUT ALL BELT DRESSINGS"

CLING-SURFACE CO. 1048 NIAGARA STREET BUFFALO 13, NEW YORK

NEW PRODUCTS

(Begins on page 120)

Ask for Item 12

PROTECTIVE CREAMS also offer antiseptic properties

Containing Hexachlorophene, these three new creams are said to provide a "zone of inhibition" against staphylococcus aureus and to be so formulated as to be almost netural in pH to assure against irritations from free acids or alkalis. The group includes No. 211, an oil resistant, water soluble bland vanishing cream for protection against dust-borne irritants, viscous oils, greases and grimes; No. 311, a water-resistant soft cold cream for protection against dilute acids and alkalis; and No. 411, a solvent-resistant water soluble bland vanishing cream for protection against organic solvents, acetates and cooling and cutting oils of low water content.

The creams are packed in 12 oz tubes. To insure most economical use of the creams, however, manufacturer has designed the Liquicreme Dispenser, which is made of polystyrene and dispenses a pre-determined amount of cream with each stroke of the lever. Creams and dispenser are further described in a brochure. *West Disinfecting Co.*

Ask for Item 13

SPACE HEATER is designed for large industrial applications

The Model 2000 Thermobloc, capable of producing 2,000,000 Btu per hour, is designed to heat an area of 16,000 to 24,000 sq ft. The exterior has a smooth appearance and the interior design is new, having twin heat exchangers arranged in the form of a V to provide for maximum scrubbing of the heating surfaces by the air passing through.

Four discharge diffusers give pinpoint control of air throw. These outlets may be placed in any position and can be rotated a full 360 deg. Single ducts may be run from any outlet to adjoining rooms if heat is needed there.

Requiring less floor space and headroom than many heaters, this new Thermobloc's normal air output is given as 22,000 cfm, and the air intake velocity 440 fpm. *Prat-Daniel Corp.*

Ask for Item 14

CONCENTRATOR for drying agent used in air conditioning

This improved concentrator is for the drying agent used in company's controlled humidity air conditioning method, which uses the drying agent to absorb moisture directly from air, reducing humidity without refrigeration. The drying agent is a liquid (Hygrol) with hygroscopic properties.

In the new model, diluted liquid is sprayed into an air stream over heating surface which raises its tempera-

Introducing smoke into the schoolroom model to make air flow visible. Ronald Chatham photo

VENTILATION GOES TO SCHOOL

Texas Engineering Experiment Station tests show what kinds of windows and window detailing provide the best warm-weather ventilation

IF SCHOOLROOM—or plant—ventilation is a problem that concerns you, here's a report from the pages of "Architectural Forum" we know you'll want to read.

In it, you'll see how sun hoods, window types, and outlet wall openings effect the over-all air flow pattern throughout the room . . . how, with proper design, schoolrooms can be made comfortable—even in hot weather.

If you missed reading this factual and timely report, we'll be glad to send you a copy. Just mail the coupon.

With special test equipment, velocity of air flow within model is accurately measured.

Insulux Division
American Structural Products Company
Dept. PE6, Box 1035, Toledo 1, Ohio
Send me a copy of the "Forum's" report: "Well-Ventilated Schoolrooms."

Name_____

Address_____

City_____ Zone_____

State_____

INSULUX GLASS BLOCK

INSULUX GLASS BLOCK

A product of the Owens-Illinois Glass Company, Toledo 1, Ohio

V-BELTS of tough neoprene resist attack from grease and oils.

AIR HOSE with neoprene cover resists sunlight, weathering, aging.

CONVEYOR BELTS of neoprene resist heat, have long service life.

MINE CABLE with neoprene jacket won't propagate flame, resists abrasion, cutting, chipping.

VIBRATION DAMPENERS of neoprene resist permanent distortion, stay resilient, last longer.

NEOPRENE PRODUCTS LAST *LONGER*

...give outstanding service where many other resilient materials fail

Ask your supplier about neoprene's performance in products like V-belts, conveyor belts, gaskets, hose, protective coatings, and motor mounts. He'll be glad to tell you about case after case where *neoprene* was the answer to a difficult production or maintenance problem. Although Du Pont makes no finished goods of neoprene, perhaps we can be of assistance in determining the resilient material you should use. Write to: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division F-6, Wilmington 98, Delaware.

DU PONT
REG. U.S. PAT. OFF.

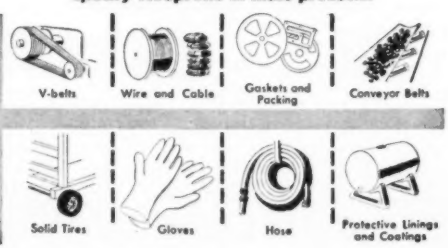
150th Anniversary

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

NEOPRENE

The Rubber Made by Du Pont Since 1932

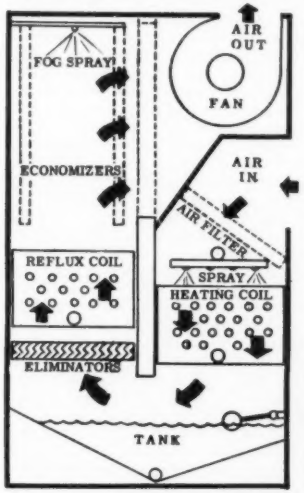
Specify* Neoprene *in these products:



NEW PRODUCTS

(Begins on page 120)

ture, evaporating the water from it. The air stream then passes through eliminator plates which remove the liquid drops. Then, in a second stage it passes over a cooled reflux coil



which raises the relative humidity in the chamber, condensing the absorbent vapor. In the third stage (the economizers) it passes through filtration cylinders. Here the building up of high humidity completes the condensation of the absorbent liquid and its droplets are caught by the filters. The reconcentrated absorbent drains to the tank, from which it returns to the air conditioning unit. *Niagara Blower Co.*

Ask for Item 15

CONVEYOR SYSTEM empties, cleans drums automatically

Here's a fully-automatic enclosed conveyor system designed for emptying up to 40 drums per hour, and adaptable to many processing operations. It comprises four principal units; enclosed automatic skip hoist; transfer conveyor; automatic drum washer, and lowerater.

In operation, a roller conveyor brings drums (30- or 50-gal size) to skip-hoist enclosure, an air-operated door automatically opens and a drum is pushed in onto an elevating carriage by an air-operated pusher. As the door closes, clamps on the carriage grasp the drum and the hoist elevates and upends it, emptying contents into a receiving hopper. Then clamps are released and the drum dropped onto the electrically-vibrated grating to dislodge any remaining material.

Then the exit door opens, a ram pushes the drum onto the transfer conveyor, which moves the drum into the automatic washer where it is cleaned inside and out, washed, rinsed and blown dry. From the washer the drum travels to the lowerator and is fed to discharge conveyor. *Gifford-Wood Co.*

Ask for Item 16

PLASTIC CARBOY is designed for transporting chemicals

A new solution to the old problem of safely transporting bulk quantities of poisonous or corrosive acids and other caustic materials is offered in this new "bouncing" plastic bottle. Blow-molded in one-piece of flexible polyethylene and claimed unbreakable, bottles are used in plywood jacketed containers.

The new carboy is suggested for use with industrial acids, caustic soda solution, hydrogen peroxide, photographic chemical solutions and other liquids. Company says the chemically-inert bottles can be used over and over again, and being round, require less shipping and storage space. It's also pointed out that the new units, being lighter in weight, afford reduced shipping costs. *Plax Corp.*

Further details on any product are available without cost or obligation. List item numbers on the postage-free cards on pages 37-38, 171-172.

IT HOLLERS FOR HELP
BEFORE IT'S HURT—

1. LOW OIL LEVEL PROTECTION
2. THERMAL OVERLOAD PROTECTION
3. STARTING UNLOADER . . . Interlocked with Controlled Pressure Lubrication

In addition, the "Y" also offers all the usual modern features . . . two stage compression . . . air cooled design . . . pressure lubrication . . . automatic pressure control. They're available with displacements from 6.2 to 68 cfm. Motor capacities from 1½ to 15 hp.

Accessories For The Work

PRESSURE REDUCING VALVES
Durable, dependable . . . supplied in varying capacities and for pressures ranging from 5 to 250 lbs.

WATER-COOLED AFTERCOOLERS
Remove moisture . . . deliver dry air to machines. The Westinghouse Type "W" aftercooler is furnished in a full range of sizes.

"SAVAIR"® COCKS
Two-way, three-way, and four-way, key type cocks. Available in sizes ranging from ¼" to 2".

INDUSTRIAL PRODUCTS DIVISION
WESTINGHOUSE AIR BRAKE COMPANY
WILMERDING, PENNA.

Factory Branch: EMERYVILLE, CALIF. Distributors throughout the United States . . . Consult your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co., Ltd., Hamilton, Ontario.

One of the most exacting machining operations in the production of turbo-jet engines is the grinding of compressor rotors in the Kansas City plant of the Aviation Gas Turbine Division of Westinghouse Electric Corporation. Two 24" x 96" Norton cylindrical grinders are mounted, as shown above, directly on Korfund Steel Spring Vibro-Isolators without the usual massive foundations. These grinders are 19' 6" long and weigh 27,200# each.

...by protecting grinder accuracy against external vibration

Extremely close tolerances required for compressor rotors made it necessary for Westinghouse to isolate their cylindrical grinders from heavy external truck vibration.

Conventional foundations would have required an excavation through the existing floor 7 ft. wide by 22 ft. long by 4½ ft. deep—with over 20 cubic yards of concrete weighing approximately 80,000 lbs.—for each grinder.

In contrast to this, Korfund Steel Spring Isolators permitted installation of the grinders directly on the existing concrete floor after simply removing the wood block to help reduce the height of the installation.

Tests made after the installation was completed—in which the isolators were "short circuited" out—demonstrated that it would have been impossible to do accurate work on the grinder without Korfund Vibration Control. Rigid alignment of work and grinding head is maintained, as proven by the fact that during the first two years of operation, no adjustments have been required.

Korfund Isolators more than paid for themselves in reduced foundation costs alone.

If you would like more information on how Korfund Vibration Control can save you money and increase production, write for your free copy of "Steel-Spring-Type Vibration Mountings for Machine Tools." Also, a selector chart in Bulletin G-104 gives recommendations for both normal and critical installations—for machine tools, presses, hammers, pumps, compressors and most other types of mechanical equipment. See Sweet's Catalog Files, or write us for your free copy today.

We'll gladly submit recommendations without obligation. Just contact us, or the Korfund representative you'll find in most principal cities. A half century of experience is at your disposal.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

THE KORFUND COMPANY, INC.

48-35R Thirty Second Place • Long Island City 1, N. Y.
In Canada: 2040 Victoria St., Montreal 2

Protective Coatings

(Continued from page 103)

is insufficient air. A curved pattern, similar to the shape of a peanut, is the result of the clogging of one of the horn holes of a suction feed gun. Where the pattern produced is too heavy at one end it shows clogging at the center opening of the air nozzle. A pattern narrow in the center is caused by too much air or excessive pattern width.

In preparing newly plastered interior walls or ceilings for painting, remove all excess plaster, and sand smooth any rough places, but avoid cutting through the glazed surface as this will produce a suction spot. Any blisters should be cut out and filled with patching plaster. Fill all cracks and openings around window and door casings with patching plaster. Cracks narrower than ¼ in. should be filled with plaster-of-paris type crack filler, and hair line cracks require spackling compound.

Cracks ¼ in. wide or more and broken places should be cleaned of all loose material and the edges undercut, then moistened with water, and the patching material applied with a putty knife to within ⅛ in. of the surface. After the patch has become thoroughly dry, again moisten the edges and apply additional patching material, and smooth it flush with the surrounding surface with a putty or scraping knife. Lightly rub a moistened cloth over the surface of the patch several times to smooth it before it sets hard. This will also help to cement it to the old plaster. Then sand the patch smooth after it is dry. Next brush away all dust and apply a coat of thin shellac to the patch. When this is dry, apply a coat of flat paint to the patch to eliminate gloss.

After the paint has dried on the patches, neutralize any active alkali in the plaster by coating the walls with a wash made by dissolving 4 pounds of zinc sulphate crystals in one gallon of water. Concrete surfaces which have not been allowed to stand a month or two should be washed with zinc sulphate solution also. A day or two should be allowed for such surfaces to dry thoroughly before applying paint.

New wall board joints should be carefully filled and smoothed with the materials recommended by the wall board manufacturer before painting.

Old plaster and other walls require only patching, where necessary. However, where stains or discolorations are present, the surface should be thoroughly washed and allowed to dry, then given a coat of aluminum metal and masonry paint. Aluminum paint of this type may be used as a priming coat on new plaster walls, as a finish coat on metal, concrete or brick interior walls, as a first and as a finishing

POWER PLANT ENGINEER SUBMITS WINNING IDEA IN CONTROL DERBY

An engineer in an Illinois power company writes us about a method he has devised for keeping coal feeders free of stoppages, so fuel will flow freely to the stoker. This unique system won an award in the Honeywell Industrial Control Idea Derby.

Coal comes by gravity from a storage hopper, through a mechanical feeder and then into the continuous stoker. If coal jams anywhere along the route, several ways have been devised for breaking the stoppage. But plant men want to know about the jam before coal flow is seriously interrupted.

That's where Honeywell control comes in. Low pressure air is piped into the coal feed system. A Honeywell Differential Pressure Controller is connected to two selected points along the coal chute. As long as coal keeps moving, a small pressure difference exists between the selected points. As soon as the coal stops, however, the pressure equalizes across the Controller, which immediately sounds an alarm and starts a vibrator or other equipment to break the jam.

By connecting the Honeywell Controller to the top of the hopper, operators are warned against overfilling the storage bin. A further connection tells whether coal is reaching the stoker.

Honeywell Differential Pressure Controller

NEW NEWSPAPER HELPS PLANT ENGINEERS

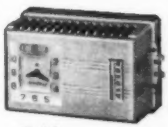
Honeywell's Industrial Division now issues a periodic publication—*Industrial Control News*—which contains detailed information on many new and unusual applications for automatic controls throughout industry. In its pages, production and maintenance men tell how they are reducing costs and increasing efficiency on all types of equipment. According to a release from the company, anyone interested in industrial controls can contribute to *Industrial Control News* . . . and receive copies . . . by sending name, company, title and address to MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Station 40, 4491 Wayne Ave., Philadelphia 44, Pa.

do you have an "IDEA" for the

Honeywell Industrial Control

IDEA DERBY?

Just send us a sketch and description of how a non-indicating control is now being used to help keep things running smoothly in your plant. Think about it! Then send it in! An impartial board of judges will rate it in terms of its importance to the maintenance of plant operations. You may win a Honeywell Electric Clock Thermostat or one of the other special awards. All material submitted becomes the property of MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4491 Wayne Ave., Philadelphia 44, Pa.



Win a
HONEYWELL ELECTRIC CLOCK THERMOSTAT

MINNEAPOLIS
Honeywell
First in Controls

Gruen

Watch Co., Cincinnati, makers of famous precision watches

Saves

Space for production utilizing unused overhead space, saves

Time

by eliminating unnecessary handling

With

assembly belt conveyors and

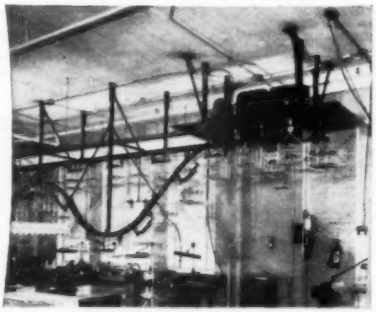
Buschman

"Universal" Overhead Trolley

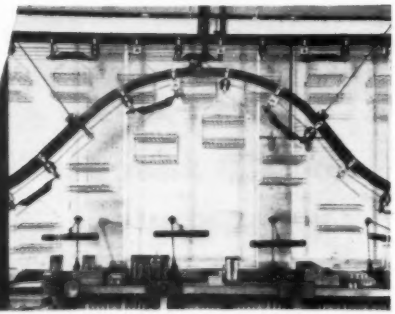
Conveyors

A real "profit" combination

Cable Conveyor originating from floor below being fed by battery of belt conveyors.



Compact drive unit and bolted ceiling supports for easy future rearrangement.



Example of aisle rise and pendant hangers.

BUSCHMAN Universal Overhead Cable Conveyors are a "natural" for close-quarter operation. Head space for aisle passage is accomplished by quick vertical rise curves and transfer of parts from batteries of belt conveyors to cable conveyor is easily executed. Special pendant hangers keep parts in position regardless of incline. Moving ceiling storage is created. Bolted ceiling supports make possible future system rearrangement. Many hundreds of users now standardize on BUSCHMAN Overhead Cable Conveyors. Write for details.

THE E. W. BUSCHMAN CO.
4426 Clifton Avenue
Cincinnati 32, Ohio

PRODUCE MORE ... FOR LESS on Buschman Conveyors

coat on wall board (two coats generally being required to eliminate flat spots caused by absorption of the first coat), or as an undercoat on old painted walls.

Where new interior plaster walls are to be painted, first apply a priming coat of flat paint or aluminum paint, then a coat of prepared size (or preferably another coat of paint), and finally a finish coat of flat or semi-gloss paint, or enamel, though enamel is usually used only on trim.

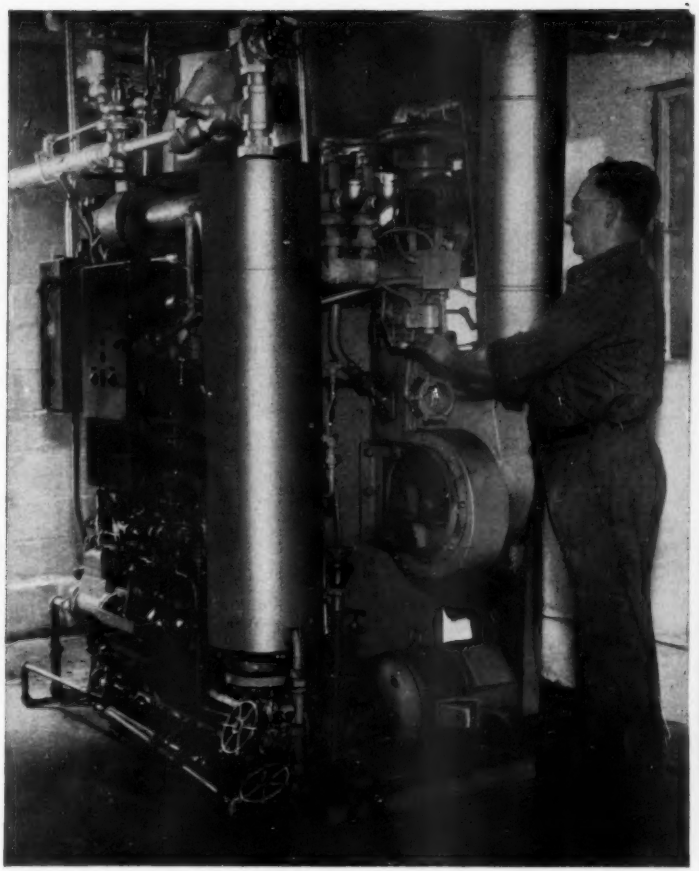
Previously painted walls and woodwork should be washed with a strong solution of cleaning powder to remove dirt and grease. If wax is present, it should be removed with a turpentine-saturated cloth before washing. The surfaces should then be allowed to dry thoroughly before applying paint.

Interior paint dries quite rapidly and hence must be applied quickly. Never go over a painted surface to smooth it as this will only make it rougher. Dip the brush only about one inch into the paint, slap out excess paint on the inside of the container, and carry the loaded brush to the surface. Coat in an area about a foot square quickly and roughly, then go over it immeditely with light strokes of the ends of the brush bristles to distribute the paint and lay it off smoothly. Finish by using semi-circular or swirl-strokes, brushing only enough to spread the paint uniformly. Excessive brushing must be avoided. In order to avoid leaving brush marks on the fresh surface, turn the brush slightly at the end of each stroke, as shown in Fig. 3. If possible, work away from the light so that the wet paint edge can be seen. The ceiling should be painted first, working in strips of convenient width from left to right. Each strip should be completed in time to start the next strip at a wet edge, to avoid laps. Larger ceilings require additional painters, to insure that the araea width painted by each will be such as can be covered before the paint at the starting end of each painted strip starts to set.

Walls are preferably painted in vertical strips from the ceiling to the baseboard, using the same brushing technique as for ceilings.

When painting or enameling new woodwork, smooth rough places with 1/0 sandpaper on flat surfaces and No. 0 steel wool on irregular surfaces. Then brush away dust and apply a coat of flat wall paint (or enamel undercoater if the wood is to be enameled). After this coat has dried, apply one or more coats of finish paint or enamel, allowing sufficient time for each coat to dry thoroughly. If enamel, lightly sandpaper and dust each but the final coat.

In spray painting interior ceilings and walls, all surfaces not to be painted which will be reached by



Why not—

make your steam *where you use it?*

You buy a boiler 15 or 20 feet square (or more) and just as high, and chances are you don't have room to install it very near to the places — often widely separated — where steam is to be used. So what do you do? You install, insulate and maintain expensive steam lines from the place the steam is produced to its point of use and then you continue to pay for inevitable condensation losses which can only mean higher steam costs.

Why?

Well, for one reason — some situations may make that the only practical way to do the job. *But* — in a great many instances you'll make a big saving in time, space and money by selecting the C-E Re-circulation Steam Generator — the unit that permits you to make steam *where* you *use* it.

If you have a space 7 feet square and about that high, that's all you need to set up the C-E Re-circulation Steam Generator. It's more than a "package" boiler — it's a complete steam plant including all controls and auxiliaries — a fully integrated unit — producing up to 6,000 pounds of steam per hour.

So — if you need steam . . . for continuous or intermittent load . . . for heating or processing — or both . . . for a location in your plant not now served by your existing boiler plant . . . for an occasional demand which exceeds the capacity of present boilers — if you want any or all of these, plus the advantages of maximum output from minimum space, then your best bet is the C-E Re-circulation Steam Generator. Don't buy any boiler in its capacity range until you investigate C-E.

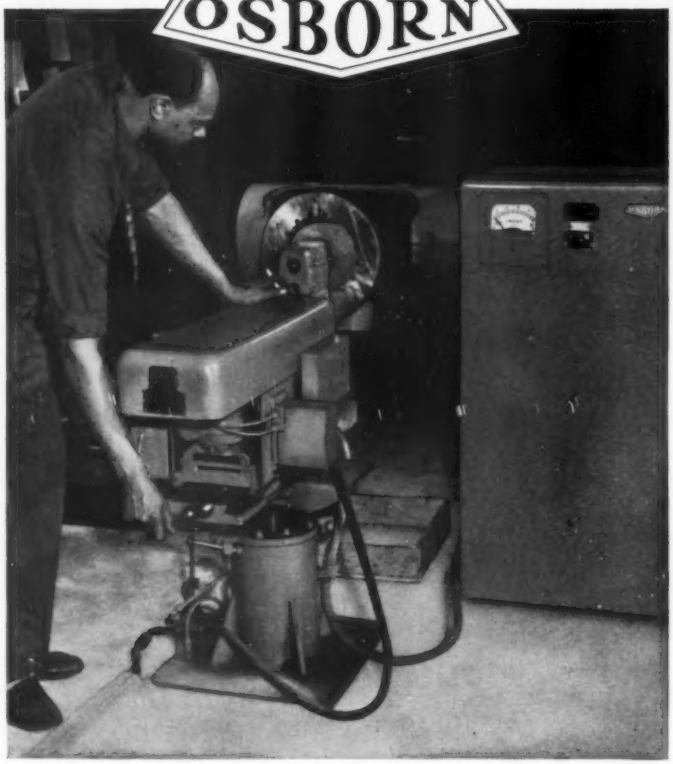
C-E

COMBUSTION ENGINEERING — SUPERHEATER, INC.

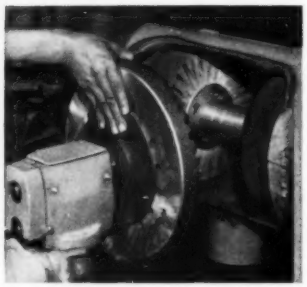
B-523A

200 Madison Avenue, New York 16, N. Y.

OSBORN



SET-UP IS SIMPLE. The machine is versatile. If your production involves small runs of many different types and sizes of gears and similar parts, you can specify machine settings for each part and operator can make set-up changes easily and quickly for maximum daily output. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.



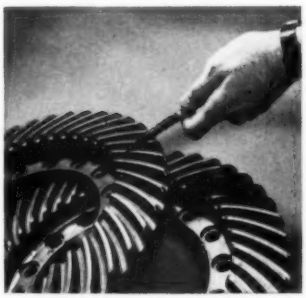
OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation.

Deburrs gears 15 times faster at the push of a button!

Want to break a big bottleneck in the production of gears and similar parts? Manufacturers are doing just that with the Osborn Work Holder Brushing Lathe.

In the plant of the White Motor Company, Truck Division, Cleveland, Ohio, this Osborn machine deburrs and finishes gear teeth 1570% faster than the old method. This was done formerly with a portable grinder . . . a tedious operation that took 25 minutes for the 14-inch hypoid gears shown. Now, an operator simply places the gear in the Osborn Work Holder Brushing Lathe, pushes a button and the machine does the job automatically. Floor-to-floor time is only 1½ minutes! Uniformity of finish results in additional time savings in matching and assembly of gears.

It will pay you to investigate this high-speed, high-quality machine for deburring and finishing gears on a production basis. Call your **O**sborn **B**rushing **A**nalyst today or write *The Osborn Manufacturing Company, Dept. 745, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear tooth has smooth, uniform rounded edges. Surfaces are blended.

INVESTIGATE IT TODAY

for *your* problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

the spray must be covered with paper or masking tape. The paint is applied to the ceiling first, following the same precautions in always painting from a wet edge as when using a brush. The walls are generally painted in vertical strips, using a horizontal fan spray pattern and a one-half overlapping stroke. Cutting-in around vertical edges of windows and doors should be done with a vertical fan spray pattern. And it is well to reduce the size of the spray pattern for all cut-in work.

In selecting painting colors, it should be remembered that the right colors are extremely important to employee morale and hence to general over-all efficiency. This can best be understood by thinking of how we feel on a bright, sunny, blue-sky morning compared to a gray, glowering one. This is proof of the influence color has on our general mental attitude. "Warm" colors can make cold areas seem warmer and more cheerful, while "cool" colors can help relieve the feeling of oppressiveness in normally warmer locations.

Water Saving

(Continued from page 97)

a lack of water or a drop in water pressure. This was deemed necessary to protect the compressor against overheating in event of failure of the motor-pump or a clogged water line. This was accomplished by installing a mercury tube pressure switch in the water line leading to the aftercooler from the pump. This switch was connected to a warning horn, so that any drop in pressure below the predetermined setting would close the switch, sound the horn, and give warning that trouble existed within the system. And with this addition, we felt we had now accomplished our purpose—to provide a simple system, automatic in operation, and relatively foolproof.

Having taken care of the major problem, we turned our attention to the two minor problems. One of these problems was a pair of vacuum pumps, located side by side, and likewise being cooled by city water; and although the water consumption here was low, the discharge flow was going into the sewer drain. The second minor problem was an air cooling tower which was used in conjunction with a drying oven, wherein spray nozzles saturated air filters through which the cooling air was being passed. The consumption here was solely for make-up to take care of evaporation, but in a low humidity climate this can be of considerable quantity.

Our first step was to control the flow through the vacuum pumps to the minimum required for adequate cooling, which we did by utilization of an additional valve that was preset and thereafter not disturbed. We then tied together the discharge lines from the two pumps, and piped this water into the make-up reservoir for the oven cooling tower. Even though there is still a slight overflow from this reservoir into the drain, we felt that this was the most economical approach to providing at least "double utilization" of this water.

The results of this water saving project were most gratifying. In the first partial month of use our total plant water consumption dropped to one-seventh of its original figure; the following month we hit one-tenth of our past usage, and this figure remained around 10 per cent during our checking period. And, as we stated before, the cost savings which we realized more than repaid the capital investment during the first year of the system's operation.

This story would not be complete, however, without one additional comment. These major sources of water waste will always be discovered and corrected sooner or later. But it is easy to ignore the hundreds of tiny leaks and drips which can, through accumulation, become just as wasteful and just as costly. Consequently, it is essential that we provide frequent inspection of all valves, faucets, and other outlets to be sure that they are maintained.

"Standardized on NORGREN for years... Extremely Satisfactory"
NATIONAL ELECTRIC WELDING MACHINES CO.
PLANT REPORT
PROBLEM:
To find standard lubricating, air pressure regulating, and air line filtering equipment which would be readily available in sizes and types for easy make up into various assemblies for a wide range of specially designed production-line resistance welders.
SOLUTION:
Use of Norgren Lubricators, Regulators, and Filters.
RESULTS:
"National Electric Welding Machines Company has standardized on Norgren air accessories for years and has found them to be extremely satisfactory.
This special 200 KVA Seam Welder automatically roll-forms, sizes, feeds and mash-seam-welds metal containers from 15" to 25" dia. and 10" to 30" long. This is a typical National Electric Welding Machine Company product, using Norgren lubricators, air line filters and air pressure regulators. Primary air pressure ranges from 80 to 100 psi; secondary from 60 to 80 psi.
• VALVES
• FILTERS
• REGULATORS
• HOSE ASSEMBLIES
Manufacturers of Quality Pneumatic Products for 25 Years.
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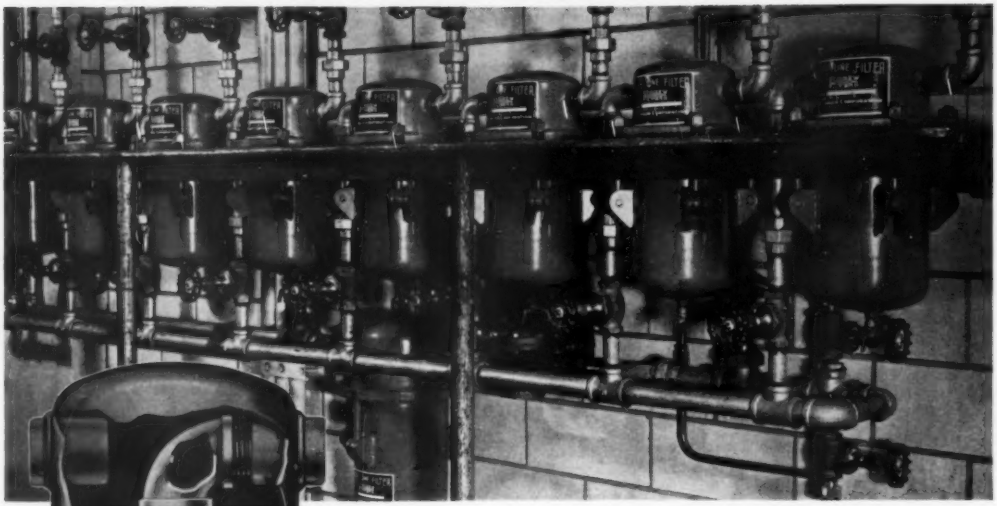
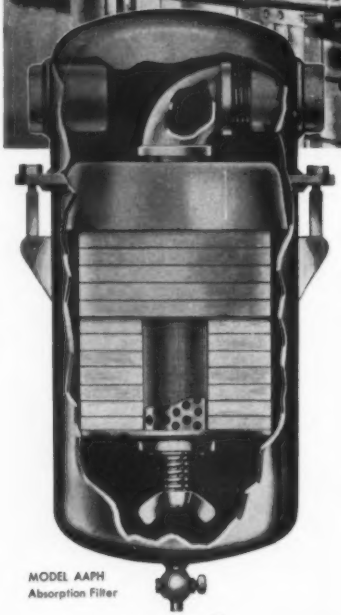
IN COLORFUL COLORADO
C. A. NORGREN CO.
3443 So. Elati—Englewood, Colorado
(Suburb of Denver)
Gentlemen: Please send me your free Norgren Blueprint No. 115, giving complete data on above lubrication system.
NAME
ADDRESS
COMPANY

THESE STAYNEW ABSORPTION FILTERS

Protect Automatic Combustion Controls from All Oil, Moisture, Solids



Specially developed Staynew Filters guarantee clean, dry air for Boiler Controls at Rochester Gas & Electric Corp.



MODEL AAPH
Absorption Filter

The Rochester Gas & Electric's new automatic boiler controls needed *clean* air for efficient operation—air that's free of oil and moisture as well as solids. In order to accomplish this, coke and then charcoal filters were tried. An accumulation of oil continued to "gum up" the reducing valve feeding the master control. Our engineers were called in, and after thorough study, a special felt pad filter (shown at left) was developed and the new filters were installed. *Result*—no fouling has occurred in the control air system since the filters were installed in 1949.

If you have a special filtration problem call on Dollinger's experienced engineers. Write today for Bulletin B-1A.

Representatives in Principal Cities

DOLLINGER PROTECTOMOTOR STAYNEW FILTERS

DOLLINGER CORPORATION

55 Centre Pk., Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

INDUSTRIAL FILMS

Filmstrips on Centrifugal Pumps

Now AVAILABLE through Allis-Chalmers general machinery division district offices is the first in a series of a new educational service to industry in the form of three 35mm sound filmstrips on centrifugal pumps for showing before interested groups.

Titles of the three films, each with a running time of about 30 min, are "How and Why of Centrifugal Pumps," "Pump Maintenance," and "Covering All Angles." This latter describes the selection of a pump and gives information required to figure its installation.

Slidefilm on Motors

A BLACK-AND-WHITE 35 mm, sound slidefilm and allied literature on "Selection and Application of Fractional Horsepower Motors" has been announced by the General Electric Co.

This new slidefilm becomes the tenth in a series of the company's Motor Selection Course. The first three slidefilms cover fundamentals of motors, types of motors and fundamentals of motor selection. The following six films show how to select and apply polyphase induction motors, single-phase integral-horsepower motors, d-c motors, synchronous motors, gear motors and adjustable-speed drives. The new film to be added tells how to study the driven machine, how to determine the motor horsepower, the electrical characteristics, the control equipment required and the mechanical design features.

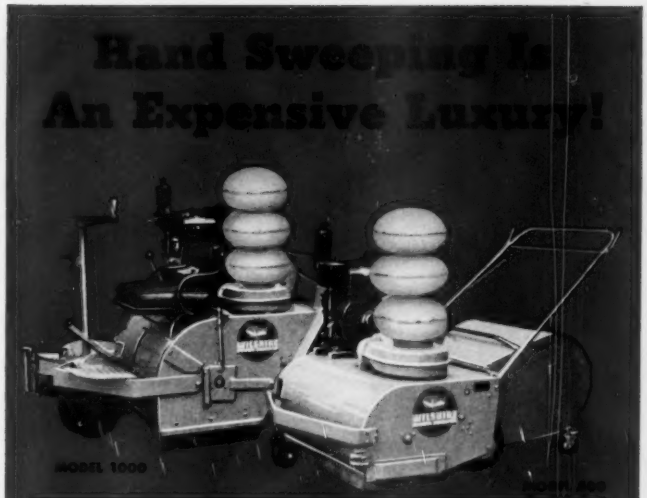
The complete course is available for single showings by contacting G-E apparatus offices, or it can be purchased outright from the company.

Film on Lift Truck Operation

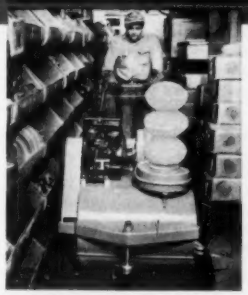
THE MOTION picture, "Serves You Right," available on a loan basis, shows how a number of industrial plants have effected efficient and economic plant maintenance operations through the use of lift trucks and towing tractors.

This 15 min sound movie, in black and white, also features the use of industrial radio in the operation of a fleet of trucks working in both plant maintenance and materials handling activities.

The film is available to plant executives, schools and colleges, transportation and materials handling groups, foremen's clubs and others with a legitimate interest in plant maintenance and materials handling operations. Requests for the movie should be addressed to the Clark Equipment Co., Industrial Truck Division, Battle Creek, Michigan.



THERE'S A
WILSHIRE POWER SWEEPER
TO FIT *YOUR* NEEDS
IT CUTS YOUR SWEEPING COSTS 75%
(A Free Demonstration Proves It)



WILSHIRE sweeps inside, right up to walls, posts, down narrow aisles; faster and cleaner than a man with a broom.

WILSHIRE sweeps outside areas, too — parking spaces, plant yards, driveways, sidewalks, etc.

YOU SAVE ALL THESE WAYS WITH
WILSHIRE POWER SWEEPERS

You save manpower for more productive work; that means you cut sweeping cost because 1 man with a WILSHIRE Power Sweeper sweeps as much area per hour as 5 to 10 or more men with brooms. WILSHIRE sweeps without dust; that eliminates sprinkling and sweeping compounds. WILSHIRE sweeps cleaner because the patented "Duscon" system sorts the dust from the debris.

A SIZE FOR EVERY PURPOSE

Five WILSHIRE Models for sweeping 27", 36" and 48" swaths. For all types of sweeping from light to heavy duty. Easy to operate; easy to maintain. A survey enables us to recommend the Model and Size best suited to your needs.

Write or wire for the name of your nearest WILSHIRE Dealer. He will give you a Free Demonstration in your own plant.

WILSHIRE
POWER SWEEPER
526 West Chevy Chase Drive
Glendale 4, California

IN CANADA — PLANT MAINTENANCE EQUIPMENT CO. — VANCOUVER & TORONTO

SAVE DOLLARS...

AT THIS POINT

WITH A STABILINE AUTOMATIC VOLTAGE REGULATOR

Without the correct voltage on the production, test and inspection lines, you are operating at less than peak efficiency inviting rework time, faulty calibration and electrical defects. All of which adds up to a financial and reputation loss.

To save time, trouble and money . . . install a STABILINE Automatic Voltage Regulator to maintain a constant voltage to electrical equipment regardless of line or load changes.

There is a type and rating suited to your particular requirement. They are easily and economically adapted to your present electrical system.

THIS BULLETIN IS IMPORTANT TO FACTORY OWNERS AND MANAGERS, ELECTRICAL ENGINEERS, PLANT ENGINEERS AND ELECTRICIANS.

Here is valuable information about automatic voltage regulation and its importance to you. Send today for your free copy of this fully illustrated Bulletin S351 Simply fill in and mail the handy coupon below.

The Superior Electric Co., 1206 Thure Avenue, Bristol, Connecticut
Please send my copy of Bulletin S351.

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POSITION_____

CO. NAME_____

CO. ADDRESS_____

CITY_____ ZONE_____ STATE_____

THE SUPERIOR ELECTRIC CO.
BRISTOL, CONNECTICUT

POWERSTAT LIGHT DIMMING EQUIPMENT • STABILINE AUTOMATIC VOLTAGE REGULATORS • 5-WAY BINDING POSTS VOLTBOX A-C POWER SUPPLIES • POWERSTAT VARIABLE TRANSFORMERS • VARICELL D-C POWER SUPPLIES

BULLETINS

(Continued from page 38)

diagrams and photos illustrate book, and sections on photometric appraisals and light distribution classifications contain distribution and isolux charts. A maintenance section presents costs, information on cleaning, relamping. Lighting Div., Westinghouse Electric Corp.

147 Mercury Lamp Transformers—Sixteen-pp Bulletin 521-5 illustrates and describes a newly-revised line of transformers. Indoor (single and two-lamp) and outdoor types (multiple and series circuit) for the operation of H-1 400 w mercury lamps are included. Photos illustrate actual installations. Diagrams show connections, dimensions, mounting methods, also starting and technical data of the various mercury lamps. Jefferson Electric Co.

148 For Emergency Lighting—Form 5346 tells how to prevent sudden lighting in failure with the Exide Lightguard, designed to turn on a powerful floodlight when normal current fails. Stresses ease of use, other merits; gives dimensions. The Electric Storage Battery Co.

149 Inter-Plant Phone System—Circular 1735 is an 8-pp color illustrated bulletin explaining how private, "inside" telephone systems provide increased efficiency to large or small organizations. Discusses economy, installation, equipment, planning. Automatic Electric Co.

STEAM GENERATORS

150 Steam Generator Test Data—Sixteen-pp Bulletin 533, Revision A, presents tabulated data covering performance tests made on two of company's steam generators to determine their efficiency at various stages. These generators are designed to heat processing steam and sold to produce 2700 and 4500 lb of steam per hour, respectively. Test results show both models able to produce substantially more than rated capacities. Vapor Heating Corp.

151 Improved Steam Generator—Bulletin 2000, 28 pp, explains advance design features that distinguish this manufacturer's generator from other unit steam generators. Describes engineering differences of component features and includes numerous illustrations for easy visual reference. Also shows how these components are constructed, assembled and tested. Another section gives comprehensive data and dimensions and a list of standard and accessory equipment for the units which range from 20 to 6000 hp, for pressures to 250 psi. Preferred Utilities Mfg. Corp.

TOOLS, WELDING, MACHINE SHOP EQUIPMENT

153 Portable Electric Tools—A complete line of tools, attachments and supplies is presented in this excellent new 1952 catalog, 72 pp. Electric drills, sanders, grinders, saws and a variety of other tools are illustrated by photo, described as to features and application. Includes full ordering information, prices. The Black & Decker Mfg. Co.

154 Arc-Welding Accessories—Illustrated Bulletin GEC-864 covers more than a dozen holders, ground clamps and connectors, and describes the uses, operation and specifications of each. General Electric Co.

155 The ABC of Surface Grinding—Here's a pocket-size handbook giving 88 pp of information on surface grinding. A section on know-how gives general suggestions, hints on operation of various types of surface grinders, and on the care and use of the magnetic chuck. A chapter on selection explains how a grinding wheel cuts, discusses composition of wheels, wheel markings, pertinent factors on choice of wheels. A section on trouble shooting tells how to avoid and correct common surface grinding faults. Norton Co.

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(A) Sturdy Steel Casing gives maximum rigidity and freedom from vibration. Rust resistant.

(B) Improved Header Design requires fewer solder joints; assures uniform heat distribution; equalizes expansion through tubes.

(C) Adjustable Motor Bracket permits perfect centering of fan in one-piece fan shroud.

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Throw heat where you want it ...provide quiet operation

With Dunham Horizontal Discharge Unit Heaters overhead, you can solve many space heating problems . . . comfortably . . . economically . . . and quietly.

Comfortably because these heaters are designed and constructed to give most effective heat distribution while maintaining perfect balance between air volume, velocity and final air temperature.

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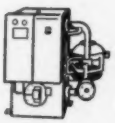
You can depend on Dunham products for quality performance, regardless of your heating equipment needs. Dunham Vacuum Pumps, for example, pull *up to 26 inches* of vacuum year after year. Dunham Convectors continue to provide comfortable, economical heat with no care other than periodic cleaning.

For further information on Dunham Unit Heaters, write for Bulletin 1301-20. Similar literature available on other products.

Convector Radiation



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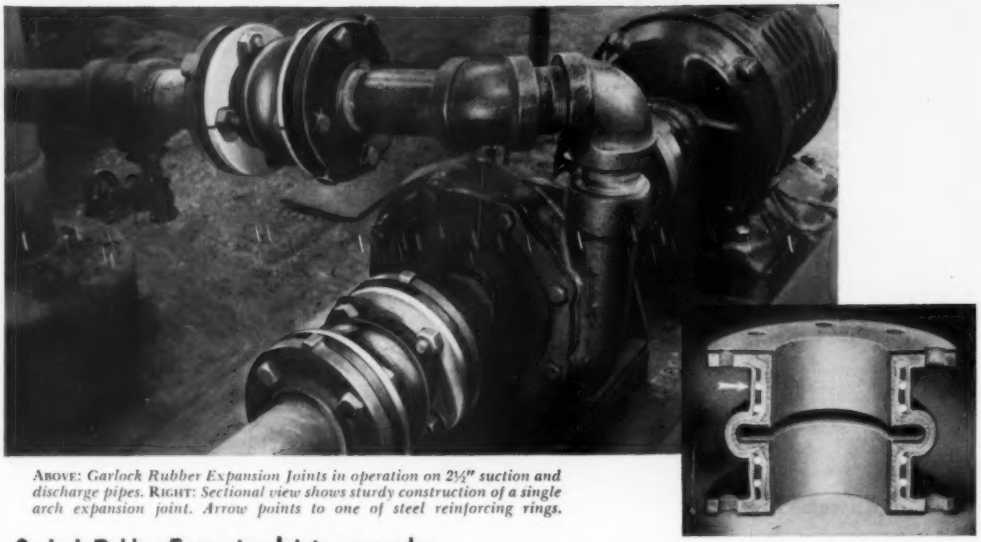
STOP VIBRATION–
relieve stresses and strains in piping and equipment



ABOVE: *Garlock Rubber Expansion Joints in operation on 2½" suction and discharge pipes.* RIGHT: *Sectional view shows sturdy construction of a single arch expansion joint. Arrow points to one of steel reinforcing rings.*

Garlock Rubber Expansion Joints are made:

- With single arch for normal expansion, contraction and vibration.
- With multiple arch for excessive pipe expansion.
- With filled arch for lines carrying sediment.
- Tapered for connecting pipes of different diameters.
- "U" type for vacuum to reduce vibration and noise on pipe lines conveying coal-laden air to pulverized coal burners and other types of light construction piping.
- With control units for excessive elongation of unanchored pipes.
- With neoprene lining for lines carrying water or air with some oil present.
- With neoprene lining and neoprene cover for lines carrying slight amount of oil and where exterior of joint is subject to oil drip or oil vapor.
- With neoprene throughout for lines carrying petroleum derivatives.
- In all pipe sizes from ¾" to 72".

Specify No. 204 for *Pressure*; No. 205 for *Vacuum*; and No. 206 for *Pressure* and *Vacuum*.

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8 Big Advantages:

1. Made of high-grade rubber, they do not crack or fracture under repeated flexing.
2. They do not take a permanent set.
3. For pressures up to 125 p.s.i. (depending upon size of joint); and for vacuum of 30 in. of mercury.
4. Suitable for operating temperatures up to 180° F.
5. They do not corrode or erode.
6. They are light in weight and can be installed in a limited space.
7. They require no gaskets between the flanges of the joint and the flanges of the pipe.
8. They do not induce electrolysis.

GARLOCK

**PACKINGS, GASKETS, OIL SEALS,
MECHANICAL SEALS,
RUBBER EXPANSION JOINTS**

156 **Here's How to Solder**—This little 16-pp booklet will fit in your shirt pocket, but it covers the fundamentals of soldering. Contains simple instructions and illustrations aimed at making soldering more successful and easier to do. Takes you step by step from the choice of alloy through the application of the solder, outlining correct procedure to form a strong joint. Federated Metals Div., American Smelting and Refining Co.

157 **To Step Up Drilling Jobs**—This 20-pp illustrated booklet introduces the MagnaDrill, a new concept in industrial drilling. Tells how this production drilling machine offers size and power advantages of 17- and 20-in. drill presses. Shows six basic elements of the drill; explains how it works, what it can do. Photos show some of the many possibilities and time-saving features. Magna Engnieering Corp.

158 **How to Reduce Vibration**—This 20-pp booklet presents brief, informative data on a shock-absorbing felt. Explains why machine mountings are necessary, how company's Vibra-Mount felt reduces vibration as much as 85 per cent and where it's being used. Tells how to select proper mount for job, how to install it and figure costs. American Felt Co.

159 **Self-Cleaning Filter** — How to cut coolant filtration costs up to 75 per cent with the new Houdaille Web-O-Matic web-type filter for machine tools or small central coolant systems is told in this bulletin. Describes and illustrates a ramp discharge type for applications requiring above-floor installations, and a bottom discharge type. Honan-Crane Corp.

It's easy to order these free bulletins and catalogs. Use the postage-free cards provided for your convenience on pages 37-38 and 171-172.

160 **Drill Press Feed**—Bulletin DF-110, 16 pp, illustrates and describes company's drill press feed, providing installation photos and discussing in detail all parts of the unit. Includes dimensional drawings and specification data, and also provides wiring diagrams and electrical hook-ups for combining with other packaged pneumatic devices. The Bellows Co.

161 **Ideas on Tools n' Parts**—The "Hard-N-Tuff Idea Book," 24 pp and pocket size, describes 36 cases in which manufacturers have cut costs, saved steel and prolonged tool life through a new method of case hardening. Contains eight hardening hints to overcome problems, cut costs and improve results and gives a step-by-step description of process, plus a chart of proper temperature ranges for heat treating different steels. Doughty Laboratories, Inc.

162 **Low Cost Molds** — Bulletin 99 explains the making of complex molds quickly and economically by metal spraying. Some examples of molds made by this method are pictured. Also shown is the equipment required for the job. Metallizing Engineering Co.

MECHANICAL POWER TRANSMISSION

164 **Speed Reducer Data** — Newly-published Bulletin G-WWH, 48 pp, describes company's complete line of double-worm and helical-worm gear speed reducers. Full data is provided on horsepower, output torque and center distances for reductions up to 6400:1. Detailed information on how to select double reduction gearing, examples of selection hp rating tables, dimension sheets and physical data are included. DeLaval Steam Turbine Co.

165 **Overload Release** — Bulletin A-616 gives full information on the new Tri-Matic overload release designed for company's torque-arm speed reducer. Pictures

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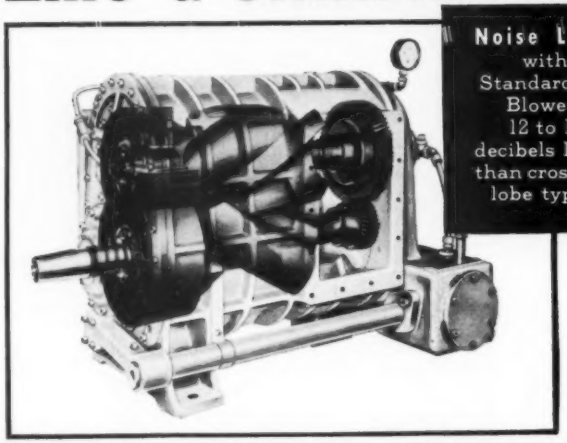

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the release set and tripped, and tells how it offers protection against breakdowns. Includes sizes, prices. Dodge Mfg. Corp.

167 Worm Gear Speed Reducers—General Catalog 400, 180 pp, illustrates and describes each model in company's line of worm gear speed reducers as well as worm and gear sets for built-in power transmission applications. A well organized book for selection and use of worm gearing and worm gear speed reducers, it provides engineering and application data on each unit, including dimensions, weights and rating tables—all the information needed to determine correct drive for your equipment. Available to qualified plant engineers. The Cleveland Worm & Gear Co.

MATERIALS HANDLING

168 Pneumatic Conveying — Technical information and data on handling bulk materials with company's Airstream conveyors are presented in 24-pp Bulletin 529. Diagrams basic types, charts principal applications. Includes case history studies in various industries to illustrate advantages. Dracco Corp.

169 Versatile, Flexible Tubing—Catalog 5-4 is an 8-pp folder on Spiratube, a tubing made of spring wire within overlapping plies of spirally wound fabric and designed for a wide range of ventilating and conveying jobs, some of which are described or pictured. Special features are presented and four types of this tubing discussed in detail. Includes performance data. Flexible Tubing Corp.

170 For Bulk Flowable Materials—Book 2475, 28 pp, contains photos of company's Bulk-Flo, an enclosed feeder-conveyor-elevator assembly, showing its use in a variety of applications, together with typical layout drawings, engineering data, calculation tables, charts and formulas. Over 150 materials are analyzed for average weight, size, flowability and abrasiveness. Link-Belt Co.

171 Tubular Conveyors — Form HC-541 contains about 44 pp of data on tubular conveyors for moving almost any flowable material. Shows basic types of these conveyors, tells what they're designed to do and how they are applied. Lists materials being handled to advantage with them, and discusses benefits. Gives design details and engineering data, installation and operating instructions. Included in this catalog are 14 illustrated case histories. Hapman Conveyors, Inc.

172 Improved Belt Preparation — Information on company's Magic-Vulc plastic rubber for repairing conveyor belts is contained in Form 201, a new folder. Cites actual case histories showing how this compound has greatly extended life of belts treated. Its use to repair worn spots on belts quickly and inexpensively is explained. Magic Chemical Co.

173 Wire Rope Handbook — Catalog G-15 is the new, 170-pp ninth edition of this manufacturer's wire rope booklet. Pocket-sized and thumb indexed, it is one of the handiest available from standpoints of practical information, easy reference and clarity. Provides up-to-date information on a wide range of Preformed and regular type wire ropes, slings and fittings and includes a section of data helpful in selecting the right rope for the job, installing it properly and keeping it in condition to get best use from it. Macwhyte Co.

175 Crawler Cranes — Eight-pp Catalog 700-G-21 describes a new crawler crane and shows several action views of it. Points up availability of interchangeable fronts and lists over-all specifications for the new ¾ yard machine. American Hoist & Derrick Co.

176 Tractor Maintenance Tips—Much of the life of a diesel tractor depends on the operator, according to this manufacturer's recently published "Maintenance Guide for Track-type Tractors" (Form 30247). In this 20-pp booklet, four-color cartoons tell what happens when an operator and service technician compare job notes and discuss basic methods of making tractors last longer and do better work at lower cost. Caterpillar Tractor Co.

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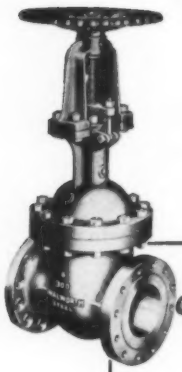
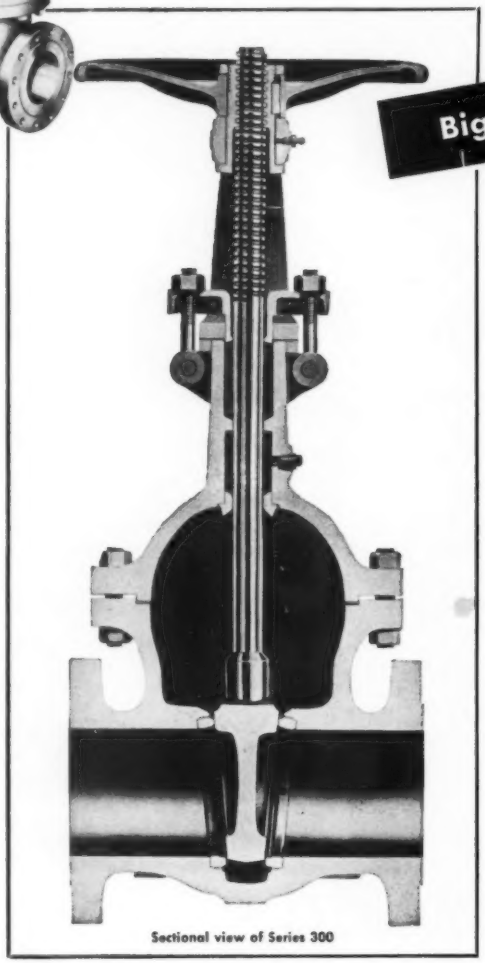
WALWORTH

Cast Steel Gate Valves

Series 150 and 300

Wedge Gate — Outside Screw and Yoke





Sectional view of Series 300

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Gland clearances are such that stem cannot be scored if gland should be tightened unevenly.

Deep Stuffing Boxes in all sizes (2" to 24") insure tightness and maximum packing life – costly leaks are eliminated.

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Seat Rings are bottom seated – not flange type. No recess exists at back of ring – hence no turbulence, erosion, or pressure drop.

Streamlined Ports allow high velocity, non-turbulent flow, and reduce the possibility of erosion.

Valves regularly have flanged ends. They can be supplied with ends for butt welding. Roller bearing yokes are available. On valves 5 inches and larger, by-passes can be furnished.

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177 **Industrial Yard Cranes** — Catalog 160-C, 20 pp, is filled with on-the-job photos showing how this manufacturer's cranes are being used throughout the continent. A section on "inside" details shows construction features of the cranes. Insley Mfg. Corp.

178 **Wheel Type Ditchers** — These two new 8-pp catalogs describe and illustrate two models of company's Buckeye ditchers. Bulletin 314 explains in detail the constructional and operational features of a pipeline and utility ditcher with fluid coupling for more efficient power transmission and longer service life. Bulletin 303 covers a versatile, medium utility ditcher featuring ease of accurate operation and efficient power transmission. State choice of bulletin or both. Gar Wood Industries, Inc.

PUMPS

179 **Centrifugal Pump Handbooks**—Two instruction booklets covering installation, operation and repair of company's single-stage single-suction and multi-stage centrifugal pumps are available. They include illustrated description of such late developments as Magic-Grip couplings, universal joint couplings with Magic-Grip bushings, mechanical seals. Suggest regular inspection procedures and include pages for maintenance records. Also provide handy reference tables explaining how to locate trouble and listing causes and cures. Bulletin 08X7813, 24 pp, covers single-stage pumps; Bulletin 06X7780 48 pp, covers the multi-stage pumps. State choice or both. Allis-Chalmers Mfg. Co.

180 **All-Purpose Centrifugal Pump** — Form S-100 is a specification folder covering company's new Model P-104 centrifugal pump, a compact, hermetically sealed unit described as completely submersible and suited to handling a wide variety of liquids. It is particularly suggested for coolant applications. Kenco, Inc.

METAL PLATING, FINISHING

181 **Unit Airblast Cabinets** — Twelve-pp Catalog 31-A shows a line of airblast cabinets in various sizes suited for cleaning small lots of work that can be manipulated by hand and the production of which is not large enough to justify more extensive cleaning facilities. Presents both pressure- and suction-type models, including a suction-type unit suited to bench mounting. Includes mechanical details, specifications. American Wheelabrator & Equipment Corp.

182 **For Simplified Cleaning**—"Scientific Cleaning for Modern Metal Finishing" is an illustrated 6-pp brochure explaining how most cleaning and processing jobs can be streamlined through application of compounds utilizing company's pH control principle. Includes information on high-speed phosphatizing, removal of heat-treat scale, many other difficult jobs. Kelite Products, Inc.

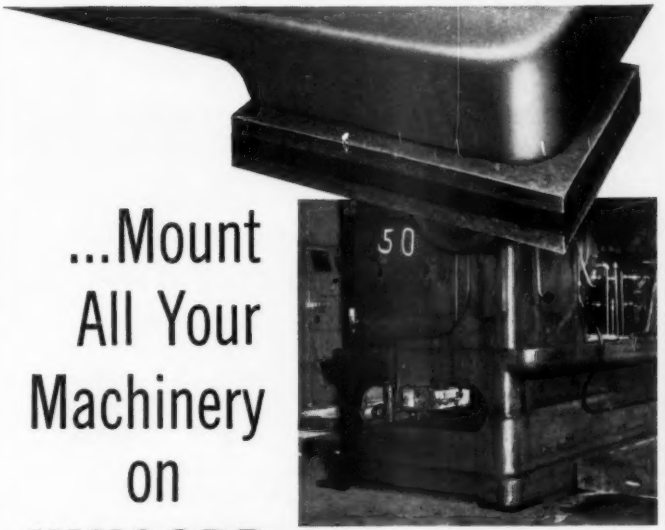
183 **Continuous Blast Cleaning**—Of particular interest to plant engineers concerned with cleaning relatively large tonnages on a production basis. Bulletin 844 explains process of continuous blasting and shows how it's being applied. In continuous milling, the work progresses in an uninterrupted flow through the machine, without stoppages. American Wheelabrator & Equipment Corp.

184 **Practical Nickel Plating** — Included in this 44-pp book are more than 40 illustrations, tables and charts. Provides basic information on electro-plating and on nickel plating and its practices. A keyed bibliography suggests 41 sources of additional reading. Information on mechanical properties of deposits, plating conditions and commonly used solutions is given. The International Nickel Co., Inc.

WATER CONDITIONING

185 **Treatment by Ion Exchange**—Methods of ion exchange treatment and its general and special applications for water and other liquids are explained in 8-pp Bulletin A. Discusses manufacturer's deionizing equipment as to construction and operation and pictures some typical applications. Illinois Water Treatment Co.

Do Away With Costly Floor Drilling



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186 Deaerating Heaters — Bulletin WC 106, 12 pp, on tray-type deaerating heaters, explains principles of successful deaeration and essential elements of a deaerating heater. Features of company's tray-type and spray-type models are given in tabular form and illustrated by drawings with identification of all parts. Also includes photos, flow diagrams. Graver Water Conditioning Co.

SAFETY, SANITATION

187 Automatic Fire Extinguishers—This folder introduces company's new plastic Safety Spray automatic fire extinguisher, a ceiling type unit described as fire resistant, dust- and corrosion-proof. Shows how it operates. Red Comet, Inc.

188 How far for a Drink?—This bulletin tells how proper placement of water coolers can save payroll dollars by cutting wasted man-hours. It is based on a study of drinking water requirements of industrial plants, and contains sample floor plans for placement of coolers, a method of analyzing drinking water requirements of any work center. Air Conditioning Div., General Electric Co.

OTHER EQUIPMENT

190 Why Colloidal Graphite — Bulletin 421 contains photos, diagrams, charts and information on the advantages of colloidal graphite in the assembly and run-in of engines and machinery. Stresses smoother bearing surfaces, close tolerances, lower bearing temperatures, lower oil consumption resulting from use of colloidal graphite. Acheson Colloids Corp.

191 Self-Contained Air Conditioners—Packaged air conditioning units in 15- and 20-ton capacities are described and pictured in Bulletin S362-A. Stresses water-saving advantage, greater cooling efficiency of these units. The Trane Co.

HOW YOU CAN GET NEW PIPE EFFICIENCY

FOR 25% OF THE COST OF LAYING NEW PIPE

24" Main before cleaning (C valve 69) 24" Main after cleaning (C valve 134) Coater in 24" main 24" Main after coating

THE PITTSBURGH-ERIC PROCESS FOR RECONDITIONING — 3" TO 24" WATER MAINS IN PLACE

FAST: Up to 1000 feet of pipe can be cleaned and lined in ONE DAY

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LOW COST: Depending on the area, the cost of reconditioning by the Pittsburgh-Eric Process is only 25 to 40% of the cost of laying new pipe.

LONG LIVED. The lining material, LECTUMEN, used in the Pittsburgh-Eric Process has high resistance to water and the chemicals used in water. More than ONE MILLION feet of pipe, reconditioned by this process ten or more years ago, is still giving efficient service.

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192 For Visible Record Systems—Kardlok, a signaling device for company's Kardex systems is the subject of Bulletin KD 680, 8 pp, containing graphic charting problems. Kardlok signals slide along a track and snap into the slot corresponding with the desired figure and date on the visible margin of the record. Shows how Kardlok can be used in record systems. Remington Rand, Inc.

193 Spreader Stokers — Dumping-grate and traveling-grate spreader stokers are described as to design and performance and illustrated in color in 16-pp Bulletin SB-42. Typical applications of both types are presented and specifications included. Also discussed are feeder assembly and hydraulic power drive unit of company's Travagrate stokers. Erie City Iron Works.

194 Templet File—This bulletin introduces the Master Planning File of 5000 flexible, film type templets, covering the most used machines and plant equipment of 150 manufacturers. Explains how these templets are made to scale, are easily reproduced by commercial methods and permit preparation of quick, exact layouts for the metal-working industry. Repro-Templets, Inc.

195 Improved Emulsion Treating—Written in non-technical language and illustrated with diagrammatic drawings and charts, Bulletin C-601, 10 pp, introduces a horizontal emulsion treater built with a steam chest. This is a closed system requiring no make-up water, removable, built to ASME requirements. Explains how treater works, how its horizontal flow offers a larger surface for separation of free water, which is removed without being heated-reducing load on heating unit. Black, Sivalls & Bryson, Inc.

196 Long-Lasting Labels — This small folder, illustrated in color, tells the merits of aluminum foil labels which are easily applied, economical and weather-resistant. Includes test data. Metal Cals Div., C & H Supply Co.

197 To Get Rid of Static—This bulletin describes and pictures the Takk static eliminator designed to eliminate all static, even at highest speeds. Tells how control works; illustrates typical installations. The John Hewson Co.

198 For Feeding Dry Materials—Bulletin 30H-12 describes loss-in-weight gravimetric feeders, discussing operation, feeding range, vibratory feeding mechanism, synchronous motor feed rate control, hopper and accessories. Stresses accuracy of the feeders. Omega Machine Co.

199 Cylinder-Finish Tubing — Bulletin R-7 describes company's Rockrite cylinder-finish tubing, showing how this compression-formed tubing can eliminate machining of cylinder-bore or individual pistons for clearance adjustments. Also shows how the Rockrite process tends to iron out pits, scratches, other irregularities. Includes sketches of typical applications, data table on tube sizes frequently met. Tube Reducing Corp.

200 Miniature Speed Changers—Technical Data Sheet 7, newly revised, describes company's Series 7 antibacklash miniature speed changers for use where backlash between high and low speed shafts must be zero or a very low value. Metron Instrument Co.

See pages 37-38 and 171-172 for postage-free mailing cards. Use them to ask for bulletins—just list the item numbers of all those wanted.

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TWINFLEX

cooling tower drive shaft and universal joint

Angular deflection and load fluctuation no longer constitute service problems in cooling tower operation.

By applying power through pre-loaded, bonded-to-metal inserts of pressure moulded neoprene, TWINFLEX drives fully compensate for starting loads and misalignment. This means protection to costly bearings and gears, and eliminates maintenance. These universal joints require no lubrication . . . in fact are impervious to oil as well as water. TWINFLEX dynamically balanced drive shafts are of electro-galvanized tubular steel and are sealed against internal corrosion. The TWINFLEX Drive shaft and universal joint are the first application of this most modern design power transmission to cooling towers . . . another in the long line of exclusive engineering advancements that makes Marley the world's largest producer of water cooling towers.

producers of
DOUBLE FLOW TOWERS
DRICOOLERS
AQUATOWERS
NATURAL DRAFT TOWERS
CONVENTIONAL TOWERS
SPRAY NOZZLES

MARLEY

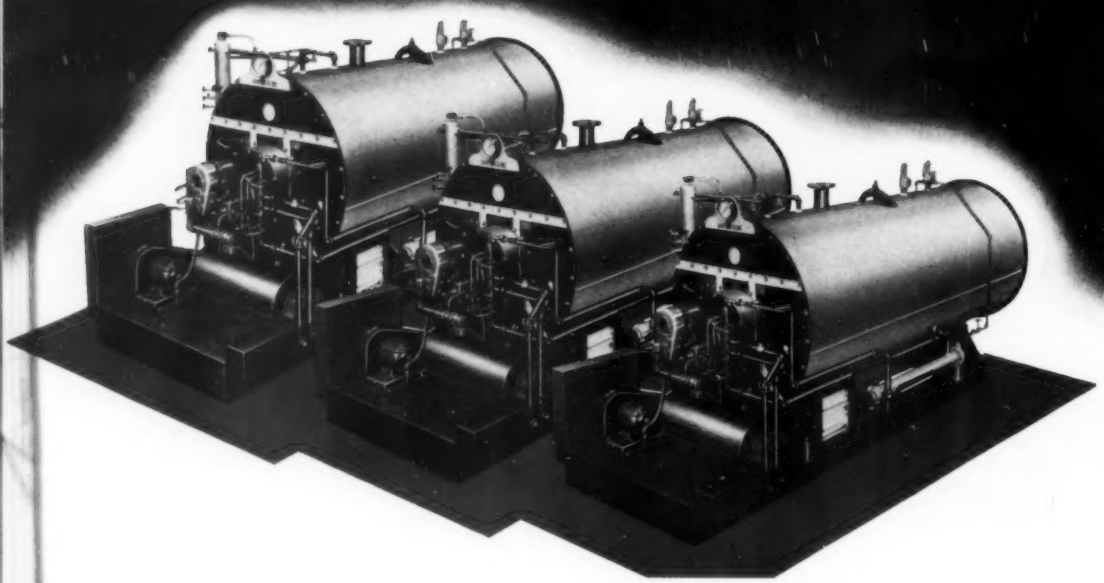
The Marley Company, Inc.

KANSAS CITY 5, MISSOURI

1+1+1=7

WHEN YOU'RE COUNTING

Superior



Battery installations of Superior Steam Generators provide extreme flexibility to meet the most widely fluctuating steam demands. A hospital installation illustrates the point.

From early June through September, steam demand is limited to the needs of hot water and sterilization. Any one of the three units carries this load with ease . . . and at higher efficiency than could be obtained by minimum operation of a larger boiler.

When cold weather adds its heating load, a second Superior Steam Generator is fired. Only the most severe weather demands firing the third unit . . . which throughout the rest of the year provides stand-by equipment which is desirable in any operation.

By employing different combinations of the three, (7 in all) allowing each unit in turn to share the load; all enjoy longer life at maximum efficiency . . . and by using only the number dictated by the steam demand, maximum economy at every stage of steam demand is assured.

Let us show you how battery installation can serve you better in your new plant . . . or augment your present steam facilities.

Write today for Catalog 405

for performance you can **BANK** *on*

SUPERIOR
STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES INC.
TIMES TOWER, TIMES SQUARE, NEW YORK 18, N.Y.

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THE POST CARD at bottom of this page and the one on pages 37 and 38 are for your convenience in asking for literature and information. Just fill them in, tear out and mail. NO POSTAGE NEEDED.

BULLETINS

BEGINS ON PAGE 37
Describes new, free commercial literature. Use post card to list item numbers of bulletins.

DATA FILE

BEGINS ON PAGE 173
Reviews manufacturers' free general catalogs. Use card to list item numbers of those wanted.

NEW PRODUCTS

BEGINS ON PAGE 120
Tells what's new in equipment. Use post card to ask for more information on products.

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Helps you find advertised products quickly. Use post card to ask for free literature offered.

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Use post card to ask for data on an article . . . tear sheets . . . name of a manufacturer . . . or help with a problem.

Index to Literature Offered in Data File

Air Conditioning	*Page 178*	*Materials Handling*	*Page 174*
Compressors	*180*	*Mechanical Power Transmission*	*185*
Construction	*173*	*Packing*	*182*
Controls	*184*	*Piping and Accessories*	*186*
Dehumidifying	*178*	*Pumps*	*180*
Dust Control	*180*	*Refractories*	*190*
Electrical	*173*	*Safety, Sanitation*	*192*
Fuel Oils	*178*	*Steam Generators*	*186*
Gaskets	*182*	*Tools*	*173*
Heaters, Heating	*190*	*Traps*	*186*
Instruments	*184*	*Valves*	*186*
Insulation	*190*	*Ventilating*	*178*
Lighting	*178*	*Vibration Control*	*184*
Lubricants	*178*	*Water Conditioning*	*185*
Maintenance	*173*		

Catalogs describing other equipment, not classified . . . . Page 192

JUNE, 1952

Card void after 6 months.

PLANT ENGINEERING

Please have manufacturers send without obligation information or bulletins indicated by following numbers.

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Please Print or Typewrite

Your Name . . . . . .

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Your Company Name . . . . . .

Company Address . . . . . .

City . . . . . State . . . . . .

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City . . . . . State . . . . . .

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Also, use this card for more information on advertised products.

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BUSINESS REPLY CARD
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PLANT ENGINEERING
110 South Dearborn
CHICAGO 3, ILLINOIS

DATA FILE of literature for the plant library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. Following catalog descriptions are handy page references to advertisements giving information on related subjects.

CONSTRUCTION

201 Glass Block and Where to Use It—This 32-pp book gives design data, information on functional and decorative aspects of glass block. Covers properties, specifications, erection procedures. Insulux Div., American Structural Products Co.
See ad on page 149 for information on school windows.

202 Building Panel Engineering Data—This 40-pp reference book for use of steel and aluminum panels for walls, decks and roofs, discusses their use, advantages, methods of installation. Covers acoustically treated panels, fire resistance ratings, electrification, acoustic roofs, reinforcing floor forms. Detroit Steel Products Co.
See ad on page 130 for information on steel window assemblies.

203 To Nail It Right—Available for use with company's hardboards in plant construction work is the "Dial-It-Right, Nail-It-Right," a small cardboard reference wheel. The "Dial-It" side shows type and thickness of hardboard for exterior and interior walls, ceilings, underlayment wainscots, bench tops, doors and other uses. Reverse side gives nailing instruction. Masonite Corp.
See ad on page 187 for information on hardboard panels.

204 Technical Manual on Plywood — Available basic data on Douglas fir plywood, its properties and use, are offered in looseleaf sections with firm binder. Presents engineering information about this panel material and its performance in varying applications. Covers commercial standards, designing with plywood, prevention of condensation, lateral bearing strength of nailed plywood joints, deflection. Please give your title when requesting this book. Douglas Fir Plywood Assn.
See ad on page 48.

205 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet A-5, 8 pp. Discusses safety features; gives fabricating data, sizes, allowable loads. Pictures some applications. Alan Wood Steel Co.
See ad on page 42.

MAINTENANCE

207 One-Coat Insulation — This 32-pp booklet describes company's Type D insulation, a sprayed-on coating for surfaces with temperature range from —40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Tells how to apply, discusses K factor, bonding properties. Insul-Mastic Corp. of America.
See ad on page 41 for information on chemical-resistant coating.

208 Roofing Manual—Engineering data on roofing is given in Specifications 50, 30 pp. Covers coal tar pitch roofings, waterproofings, insulations, flashings, protective coatings. Includes illustrated instructions. Tar Products Div., Koppers Co., Inc.
See ad on page 111 for information on corrosion resistant coatings.

209 Corrosion-Preventive Coatings—This 16-pp illustrated booklet covers a family of products for fighting corrosion. Presents characteristics and application data on hot and cold applied tar base coatings, alkyd resin coatings, chlorinated rubber base coatings, vinyl and phenolic coatings. Includes finder chart. Protective Coatings Div., Pittsburgh Coke & Chemical Co.
See ad on page 7.

210 Iron Cement Handbook — This is a 40-pp pocket-size catalog of iron cements for repair, other uses. Tells how to mix and apply them. Gives illustrated instructions for dozens of repair and maintenance jobs. Smooth-On Mfg. Co.
See ad on page 200 for information on floor repairs.

211 Floor Maintenance—This 12-pp brochure presents a complete and economical program for the care of wood and concrete floors, terrazzo, linoleum and tile. Points discussed include wear resistance, appearance, sanitation, cleanliness, light reflectance, sealers and hardeners, burnishing and buffing. The Tremco Mfg. Co.
See ad on page 180 for information on other maintenance products.

212 Building Maintenance — Handbook 7 offers 64 pp of information on floor surfacings, 12ak stoppers, external wall sealants, road patching, roofing materials. Includes instructions for use. Flexrock Co.
See ad on page 196 for information on concrete floor patching.

213 Protective Paints — Details on a rubber-base paint formulated to afford increased protection against corrosion from ac ds and alkalis, and especially applicable for use on concrete, are provided in this literature. These finishes are also suggested for use on wood, metal surfaces. Cellulose Products Dept., Hercules Powder Co.
See ad on page 174.

214 Power Brushes—Bulletin C-269, describing company's new power brushes, pictures their design. The Osborn Mfg. Co.
See ad on page 156.

215 Floor Maintenance Buyers' Guide—Brief, but practical application details on floor machines and accessories and a wide range of floor cleansers, waxes and other preparations are presented in this illustrated bulletin. Includes packaging information. Finnell System, Inc.
See ad on page 115 for information on a combination scrubber-vacuum cleaner.

216 Power Sweepers—Bulletin S-101 pictures and describes power sweepers for industrial, commercial plants. Comparative operating data are given on each sweeper as a guide to selecting correct model and size. Chart showing savings in man hours and sweeping costs afforded is included. Wilshire Power Sweeper Co.
See ad on page 159.

217 Chart on Belt Care—In the interest of conserving power transmission belting, this manufacturer offers a cardboard wall chart on the care and maintenance of power driven belts. Carries sketches and brief text covering the steps to be taken to select the right belt, install it, use it correctly and keep it in good operating condition. Cling-Surface Co.
See ad on page 148 for information on belt dressings.

TOOLS

219 Pipe Tool Book—This catalog and data book gives information on pipe and bolt machines, power units, ratchet threaders, reamers and cutters, other power and hand tools. Includes popular "operating guide" section, fully illustrated with easy-to-grasp drawings. Beaver Pipe Tools, Inc.
See ad on page 195.

220 More Holes in a Hurry—Form 2400 is a 36-pp pocket-size booklet which not only provides ordering information on manufacturer's drills, but also gives some excellent tips on how to get the most service from portable electric drills. Discusses motor, drill cord, drill chuck, right and wrong drill bit grindings, drilling of various materials, and drill maintenance. Includes tap drill sizes. Mall Tool Co.
See ad on page 192 for information on shaft machines.

221 For Faster Fastening — Form 35-A explains and illustrates company's system of fastening tools and fasteners for use with steel, wood, concrete, fabricated hard materials. Ramset Fastening System, Inc.
See ad on page 185.

222 Standard Screw Products—This 10-pp booklet about "Unbrako" standards tells what they are and the advantages of their use. Gives detailed information on socket head, cap screws, self-locking socket set screws, socket set screw points, flat head socket cap screws, shoulder screws or stripper bolts. Standard Pressed Steel Co.
See ad on page 193 for information on tool carriers.

223 Powerful Puller—Introduced in Bulletin 97-A is the compact Power-Twin, a fast-working hydraulic ram. Shows how this ram, with its center hole feature, can convert all of company's pulling systems to hydraulic push, pull or lift operation. Owatonna Tool Co.
See ad on page 190.

ELECTRICAL

225 Buyers' Manual on Motors and Control—Fifty-pp Catalog GEC-1009 presents buying information on a carefully selected group of motors, motor starters, control accessories and electronic control. Ratings listed are those most frequently required. Excellent selection data, dimensions, ratings and prices. General Electric Co.
See ad on pages 12-13 for information on motors for tough jobs.

226 Enclosed Motors—Construction features and details of totally-enclosed, fan-cooled motors with tube-type air-to-air heat exchangers in ratings from 40 hp at 600 rpm through 800 hp at 3600 rpm are described in Bulletin 51B749B. Points out that these motors come in standard and explosion-proof designs, the former for applications without explosion hazards but requiring protection from dust, fumes. Allis-Chalmers Mfg. Co.
See ad on back cover for information on motor starters for specialized industries.

227 Weatherized Motors — Six-pp Bulletin 400 describes company's All-Weather integral motors for industrial use. These have full height protection, through ventilation, one-piece steel shell, interchangeability of end head. Robbins & Myers, Inc.
See ad on page 54.

228 Big Induction Motors—Design and application features of Company's Life-Line motors (now made in ratings to 700 hp) are described in 20-pp Booklet B-4731. Applications of these motors in the paper, chemical, central station, mining, lumber and metal-working industries are illustrated. Separate sections describe the special construction of motor frames, end brackets, stators, rotors, and bearings. Westinghouse Electric Corp.
See ad on pages 68-69 for information on line starters.

229 Motor Handbook — Bulletin MU-185 provides 66 pp of engineering and descriptive data on motors, covering splash-proof and explosion-proof types, gear motors, motors for use in chemical plants, for oil well pumping, punch presses, elevators, cranes and hoists. Wagner Electric Corp.
See ad on page 29.

230 Circuit Breaker Reference Data — Catalog Section 5000 is a collection of more than 30 data sheets providing selection and application information anad ordering instructions for company's molded case circuit breakers. Fully illustrated, includes ratings, current carrying capacities, dimensions, prices. I-T-E Circuit Breaker Co.
See ad on pages 16-17 for information on selective trip breakers.

231 Plug-In Power — Sixty-pp Catalog 25 offers real help on electrical installation problems involving portable tools, materials handling equipment, cranes, hoists, cutting equipment. Covers a prefabricated trolley busway electrical distribution system to provide outlets for power or light where needed. Feedrail Corp.
See ad on page 53.

232 Bus Duct Manual—Booklet B-4272A, 68 pp on bus duct and accessories, presents application and test data, specifications, information on pricing a typical installation. Describes advantages of bus

FROM
ROADSTANDS...

TO
LAUNDRIES

CHECK CORROSION FROM ACIDS AND ALKALIES LONGER WITH

Protecting surfaces from deterioration is a "natural" for rubber-base paint. Parlon (Hercules chlorinated rubber) in protective coatings adds specific resistance to the action of chemicals, gases, moisture, mold growths, and other destructive agents.

Parlon rubber-base paint dries fast . . . seals and protects surfaces . . . resists acids, alkalies, fumes, and salts three to four times longer than ordinary coatings. Rubber-base paint is especially helpful in solving maintenance problems for laundries where moisture, humidity, and alkaline solutions are present, and for roadstands where kitchen heat and fumes are part of the working environment.

Parlon rubber-base paint is particularly durable on concrete because of its resistance to free alkali in cement. Ask your paint supplier about easy-to-apply and economical-to-use rubber-base paint—or write direct for details.

HERCULES POWDER COMPANY
Cellulose Products Department
966 Market St., Wilmington 99, Delaware

RUBBER-BASE (PARLON)® PAINTS

CR52-3

duct for a secondary power distribution system, carrying current from transformers to switchgear—and from there to motors, lighting systems, etc. Tells where bus duct can be used to advantage. Company's line of bus duct is shown and dimensions given. Westinghouse Electric Corp.
See ad on page 125.

233 Power Distribution Feeders — Catalog TEB-1, 40 pp, on heavy-duty units for main feeders in distribution system, gives construction, engineering, application data. Trumbull Dept., General Electric Co.
See ad on page 49 for information on panelboards.

234 Small Bus Duct—Detailed information on a midget-size bus duct is contained in Bulletin 703. Illustrates entire unit, also trap and hanger. Text discusses major parts, design features. Includes list prices. Frank Adam Electric Co.
See ad on page 36.

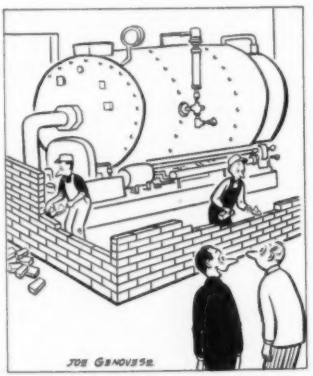
235 Snap-Action Switch—Data Sheet 63 presents a "make-before-break" snap-action switch, describing in detail, with diagrams, the function of the two moving contacts in closing the normally-open circuit before the normally closed circuit is opened. Points out how the make-before-break principle insures continuity in operation of an electrically-controlled multi-stage machine. Micro Switch.
See ad on page 138 for information on other switches.

236 Automatic Voltage Regulation—Bulletin 8-351 provides 12-pp of excellent selection data on company's automatic voltage regulators of the instantaneous electronic and electro mechanical types. Explains principles of operation of both types, their special features and applications. The Superior Electric Co.
See ad on page 160.

237 Battery Technology Handbook—This is a 56-pp revised edition of company's manual of technical instruction and engineering data on the care of motive power storage batteries. Major addition is a section on charging, which includes information on modified constant voltage and two-rate charging, boost, equalizing and emerging charging, control of discharge, etc. Other sections cover the theory of the lead-acid battery; practical tips on care and operation; maintenance and repair. Gould-National Batteries, Inc.
See ad on page 139 for information on cutting handling costs.

MATERIALS HANDLING

239 Shovel and Loader — Described in 12-pp Bulletin 1032 is a hydraulic crown and hoist shovel and loader incorporating mechanical features usually associated with big shovels. Illustrates, gives specifications, application information on both pneumatic traction and crawler traction models. Dempster Bros., Inc.
See ad on page 126 for information on other dumping, loading equipment.



"We couldn't get it into the plant so we're building an extension around it."

Engineers rate Modine the standard of excellence

COMPARE

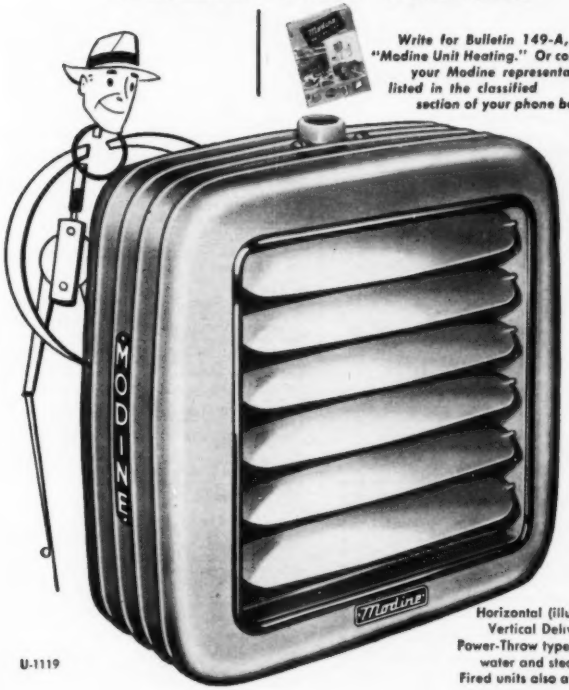
ON EVERY COUNT
MODINE UNIT HEATERS STAND OUT

Compare performance! Modine's balanced combination of discharge air temperatures, velocity and volume give you perfect heating comfort.

Compare economy! Fuel bills are smaller with Modine because heat is delivered where it's needed — not wasted at the ceiling. And installation and maintenance costs are far lower, too.

Get all the facts from your Modine representative. *Compare first* — and you'll choose Modine. Modine Mfg. Co., 1563 DeKoven Ave., Racine, Wis.

Modine UNIT HEATERS



Write for Bulletin 149-A, "Modine Unit Heating." Or contact your Modine representative listed in the classified section of your phone book.

Horizontal (illustrated), Vertical Delivery and Power-Throw types for hot water and steam. Gas-Fired units also available.

U-1119

Discharge air temperatures of 110°-120° F. are correctly related to air velocities—assure perfect heating comfort plus lower fuel costs.

Sound-silencing features assure quieter operation—certified by accurate laboratory sound ratings. Especially important for commercial and institutional use.

Sturdy, steel, integral fan guard offers safety from exposed fan — serves as a resilient, vibration-absorbing mounting for the unit's motor.

ARE YOU PACKING PUMPS

when you could be catching trout?

If you are spending your week-ends repacking pumps, you should repack with CHESTERTON "Parachute" Packing. Each ring is self-sealing and permits individual lubrication. The bottom ring has straight sides and can't roll in the stuffing box. CHESTERTON "Parachute" lasts longer, requires no attention, needs no gland pressure and adjusts itself automatically to retain full compression seal. No special adapters are required. This fully automatic packing can cut your packing costs in half at the same time it cuts your repacking time. Specify 600W for water, 600S for steam. 600HO for hot oil and 600CO for cold oil. Ask your distributor or send for full description of CHESTERTON "Parachute". *For longer, carefree week-ends, away from the job, Specify "Parachute".*

Chesterton *Parachute lasts longer*

PACKING Chesterton GUARD

PE

A. W. CHESTERTON CO., 6 Ashland St., Everett 49, Mass.

☐ I would like more data on "600"

☐ Who is my local distributor?

Name _____

Company _____

Street _____

City _____ State _____

AMERICA'S OLDEST MANUFACTURER OF MECHANICAL PACKING

240 Materials Handling Equipment — Illustrated Catalog P602 is a 44-pp guidebook on materials handling equipment for industrial plants. Subjects covered include description and application data on company's gas and electric fork lift trucks, motorized hand trucks, hand lift trucks and hand and electric hoists. The Yale & Towne Mfg. Co.
See ad on page 71 for information on powered hand trucks.

241 Feeders, Conveyors — An excellent presentation of electric vibrating feeders and conveyors is given in 90-pp Catalog 830 covering manufacturer's line of equipment for handling a wide variety of wet and dry materials and including large and small capacity units, for temperatures of -30 to 2000 F. Explains principles of design, operations. The Jeffrey Mfg. Co.
See ad on page 105.

242 Conveyor and Elevator Belts—This 26-pp collection of catalog sections illustrates parts used in construction of company's conveyor and elevator belts. Discusses increased service life and decreased maintenance. The B. F. Goodrich Co.
See ad on page 3 for information on grommet V-belts.

243 Metal Conveyor Belts — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belt; covers raised edge and flight constructions, chain edge constructions, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.
See ad on page 193.

244 Conveying Systems Manual — Unloading and conveying of dry pulverized material are discussed in 4-pp Bulletin FK-25. Text covers system and operation; stationary pump, accessories. Fuller Co.
See ad on page 141.

Use the postage-free cards provided for you on pages 37-38 and 171-172 for requesting catalogs. List item numbers of those wanted.

245 Belt Conveyor Idlers—Bulletin 51-81, 42 pp, presents latest developments of company's belt conveyor idlers and machinery. Includes engineering information helpful in designing and specifying belt idler equipment and cross-section drawings of both steel and cast gray iron idler rolls. New data on a return belt training (self aligning) idler is given, together with material on steep-angle troughed belt idlers and troughed belt self-aligning idlers. Information on lubrication material and techniques provided. Chain Belt Co.
See ad on page 197 for information on bucket elevators.

246 Fastenings for Conveyor Belts — This collection of data covers hinged fastenings, repair plates, lacings, hooks, round belt couplings, also lacers, cutters. Gives instructions for use. Armstrong-Bray & Co.
See ad on page 192 for information on gear and wheel pullers.

247 Three-Job Unit — This bulletin on company's portable conveyor-loader-stacker features an easy-to-use dimensional chart showing loading and unloading heights and other major dimensions. Also includes specifications, data on optional equipment. The E. W. Buschman Co., Inc.
See ad on page 154.

248 Hydraulic Lift Trucks—This catalog provides engineering and ordering information on manufacturer's complete Weld-Bilt line of hydraulic lift trucks in 2500- to 10,000-lb capacities. Also covers skid platforms, pallet lift trucks, two-wheel trucks. West Bend Equipment Corp.
See ad on page 182.

249 High-Lift Trucks — Bulletin 5143, 12 pp, describes and pictures company's Powerox Hi-Lift electric trucks in tilting

FEATURE FOR FEATURE...

DRY CHEMICAL

C-O-TWO

FIRE EXTINGUISHERS

are your best buy!

● These fast, positive fire killers are easy to operate, compact, well-balanced and offer extensive maneuverability indoors or outdoors... no extra gadgets protruding or complicated operating parts. The outstanding mechanical breakage feature of C-O-TWO Dry Chemical Type Fire Extinguishers, plus continuous inert gas pressured agitation or fluffing, together with a skillfully blended free flowing dry chemical guarantee lasting, foolproof fire protection. All sizes are rechargeable on-the-scene by anyone... no special tools required.

C-O-TWO Dry Chemical is a finely pulverized powder... non-conducting, non-corrosive, non-abrasive, non-freezing and non-toxic... special compound consists of sodium bicarbonate and other chemicals skillfully blended to render high fire extinguishing qualities, remain free flowing while being used and withstand long periods of storage without deterioration. When brought into contact with fire, C-O-TWO Dry Chemical absorbs a greater part of the heat, decomposes and releases fire killing gases. This heat absorption process acts as an insulating screen for the fire fighter.

Fully approved and built to rigid specifications... C-O-TWO Dry Chemical Type Fire Extinguishers are exceedingly effective on flammable liquid, gas and electrical fires, as well as surface fires involving ordinary combustible materials... rated by Underwriters' Laboratories, Inc. and Factory Mutual Laboratories for class B and C fires.

Convenient 4, 20 and 30 pound hand sizes... no syphon tubes or valves within the cylinder to become clogged or inoperative... discharge hose and squeeze type discharge nozzle remain empty until actuation takes place... one piece removable top assembly.

Also, convenient 150 pound wheeled size... sturdy, wide-faced wheels... discharge hose and two position discharge nozzle having soft or solid stream fully enclosed in protection casing... footrail and dual bar handle provide easy inverting.

Act now for complete free information on these top quality fire extinguishers. Remember... you can't put fire off... fire doesn't wait. Get the facts today!

exclusive inverting design renders constant free flowing dry chemical, assuring faster, more effective and complete discharge

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers • Built-In Smoke and Heat Fire Detecting Systems Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems

ELWELL-PARKER
1st NAME IN INDUSTRIAL TRUCKS
Benefit by the Experience that Produced—
the FIRST power industrial truck
the FIRST powered lift truck
the FIRST fork truck
the FIRST paper roll handler
the FIRST revolving mobile crane

Elwell-Parker originated the product, and has set the standard of industrial truck performance from the beginning. Elwell-Parker has pioneered truck versatility throughout industry by variations of the basic types plus design of special attachments... Today, Elwell-Parkers are available in over 80 models and capacities, either electric or gas powered... Take advantage of this unmatched experience by calling in the nearest of the 38 Truck Application Engineers. The Elwell-Parker Electric Co., 4177 St. Clair Avenue, Cleveland 3, Ohio.

FREE BULLETIN

on "Industrial Logistics." Write for it and name your product. The Elwell-Parker Electric Co., 4177 St. Clair Ave., Cleveland 3, Ohio.

ELWELL-PARKER
Power Industrial Trucks
Since 1906

and non-tilt fork types, platform and straddle types, of 2000-lb and 4000-lb capacities. Barrett-Cravens Co.
See ad on page 122 for information on other lifts and skids.

250 Industrial Logistics — Form A-9516-4450 is a 12-pp booklet covering strategic handling of materials from raw state to distribution. Discusses master unit load and transportation cycle. Explains company's system of adapting all loads to four types of containers, assembling maximum numbers of these into master unit loads, and transporting them as single units. The Elwell-Parker Electric Co.
See ad on this page.

251 Hints on Hoists—Now available to plant engineers is "144 Answers to Your Hoisting Problems." Shows how proper choice and use of hoist can step up production and cut handling costs. Reading Crane & Hoist Corp.
See ad on page 184.

252 Fast-Working Hoists — Bulletin W-815-B, 6 pp, provides electrical details on company's hoists — on wiring, brakes, motors and fast-operating, push-button controls. Standard outrig, and multi-speed controls, limit switches are described. Hoist & Crane Div., Robbins & Myers, Inc.
See ad on page 193.

253 Electric Hoist Manual—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists for low head. Manning, Maxwell & Moore, Inc.
See ad on page 182.

254 Trolley Hoists—Bulletin DH-269, 2 pp, describes and pictures ½ to 3 t capacity army-type trolley hoists, plain or geared, for use where a close headroom assembly is required. Gives dimensional and capacity data, prices. Wright Hoist Div., American Chain & Cable Co., Inc.
See ad on pages 58-59.

255 For Efficient Overhead Handling—Bulletin C-1, 56 pp, pictures overhead equipment for practically all industries. Stresses construction, safety, electrical advantages of trolleys, cranes, track and auxiliaries. Includes layout information. The American MonoRail Co.
See ad on page 32.

256 Data on Tramrail Equipment — Twelve-pp Form 2008F is a recently revised booklet on tramrail systems. Tells what an installation can do toward improving handling efficiency. Rail and arch design, switches, cranes and transfer bridges, carries, hoists, cranes, buckets, grabs are pictured. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.
See ad on pages 55-56.

257 Sheet Lifters—Operational and design features of company's sheet lifting equipment which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp, Cullen-Friestedt Co.
See ad on page 188 for information on positioners.

258 Data on Truck Casters—As much specific information as can be presented in a catalog for commercial usage is included in 105-pp Catalog 124 on truck casters. Besides specifications, ordering data and photos, this well-indexed book includes load capacity charts, defines caster terminology, tells how to select casters and install them. The Bassick Co.
See ad on page 64.

259 Trucks, Casters, Wheels — Catalog 50, 65 pp, covers platform trucks, superstructures, two-wheel and pry trucks, dollies, trailers, casters, wheels, offering a variety of chassis, superstructure, wheel combinations. Thomas Truck & Caster Co.
See ad on page 201.

260 Wire Rope Assemblies — Industrial Standards Catalog 5201, 24 pp, illustrates and gives detailed specifications for wire rope with fittings, permanently attached. Such assemblies are used for operating machinery and equipment controls, slings, hoists, and consist of a length of company's Preformed wire rope with terminal attached. Macwhyte Co.
See ad on page 45.

261 Hose Reels — Here's an illustrated data sheet covering company's Retriever hose reels which handle water, oil or air. Presents specifications on open and drum types. Explains how reels save space, afford increased safety. The Wayne Pump Co.
See ad on page 142 for information on compressors.

VENTILATING, DEHUMIDIFYING, AIR CONDITIONING

263 The Cost of Excess Moisture — Thirty-pp Bulletin 216 explains that while high humidity doesn't show it can spoil many products in process and storage. Tells how typical plants have solved the excess moisture problem by electric dehumidifiers. Pittsburgh Lectrodryer Corp.
See ad on page 15.

264 Improved Air Conditioning—Advantages and applications of a controlled humidity method of air conditioning are discussed in Bulletin 112. Process is explained, illustrated. Niagara Blower Co.
See ad on page 44 for information on an after cooler.

265 Replaceable Air Filter—Introducing the Amer-glass filter, which comes in standard sizes for forced heating, ventilating and air conditioning systems. Bulletin 211 explains its operating principle, discusses its resiliency, efficiency and maintenance. American Air Filter Co., Inc.
See ad on page 128 for information on a dust precipitator.

266 Heavy Duty Ventilation Filters — Form DPF-100.LH presents a dry panel filter with a filtering area of 23 sq. ft. Tells features, uses; includes installation data, filter selection chart. Dollinger Corp.
See ad on page 158 for information on other filters.

LIGHTING

268 Plant Lighting Planning Guide — This 32-pp handbook of industrial lighting presents economics of a plant lighting program in terms of lower production costs, reduced working time, less fatigue and eyestrain, less spoilage, fewer accidents, better morale. Explains six major steps in initiating, developing and carrying out a lighting program; tells how to select equipment and stresses importance of maintenance. Includes table of recommended levels of illumination for industrial interiors. Benjamin Electric Co.
See ad on page 113 for information on task matched lighting installations.

269 Recommended Lighting Systems—This 16-pp article describes six lighting systems adaptable to most industrial plants. They include systems for illumination levels 20 to 40 ft-c, for levels of 40 to 60 ft-c and for levels of 60 to 100 ft-c, and involve use of filament, fluorescent, and mercury lighting and combinations of these. Explains lighting classifications, and discusses advantages of each type of lighting. Lamp Dept., General Electric Co.
See ad on page 131 for information on outdoor industrial lighting.

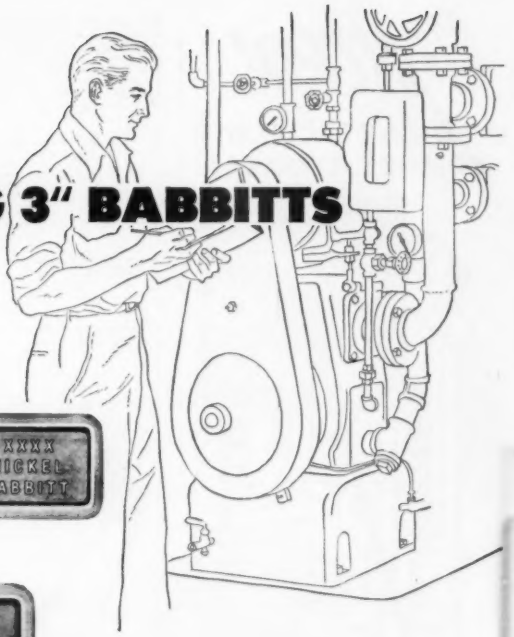
FUEL OILS, LUBRICANTS

270 The Why, What and How of Lubricants—This 20-pp booklet explains and illustrates common tests and terms describing lubricants. Covers viscosity, flash and fire, neutralization, number, penetration, specific gravity, extreme pressure, steam emulsion, corrosion. Tide Water Associated Oil Co.
See ad on page 133.

271 Cooperative Technical Consultation Service—This 24-pp booklet presents company's periodic consultation service offered to industrial plants and aimed at efficient use of petroleum products. Covers services available in solution of lubrication problems, metalworking operations, processing, fuel and heating oils, dust control. Gulf Oil Corp., Gulf Refining Co.
See ad on page 33.

272 Lithium Soap Greases — Twelve-pp Booklet AD 3084, on manufacturer's Stano-

FEDERATED'S "BIG 3" BABBITTS



KEEP MACHINES GOING

With Federated's "Big 3" Babbitts you can re-line virtually any bearing . . . keep machines going!

XXXX Nickel* is suited for almost any job that demands a tough tin-base bearing alloy . . . for high loads at high speeds.

Merit Metal*, "the Universal Babbitt," is a dense, compact, durable lead-base antifriction alloy for bearings carrying moderate loads at moderate speeds.

Frictionless* is a world-famous lead-base alloy specifically designed for bearings that operate under low loads and low speeds.

Federated's "Big 3" Babbitts are made of the best available materials, alloyed by skilled and experienced metallurgists. They are a team of varied babbitts which answer 90% of all white metal bearing maintenance needs.

For white bearing metals think of the "Big 3" . . . for any non-ferrous metal or alloy think of Federated. For a new, informative booklet "Hints On Babbitting Practice," write Dept. PE.

**Tradename of American Smelting and Refining Company*

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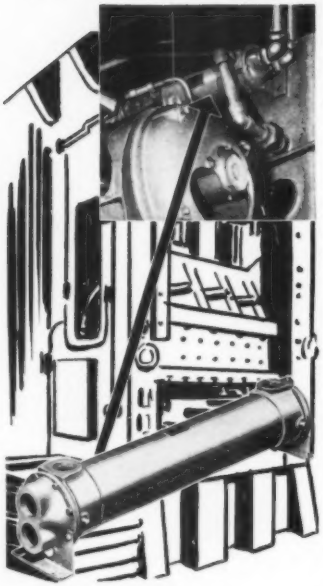
federated first in the non-ferrous field AMD

AMERICAN SMELTING AND REFINING COMPANY • 120 BROADWAY, NEW YORK 5, N. Y.

CONTROL

HYDRAULIC FLUID TEMPERATURES!



THERE ARE 132 STOCK YOUNG HEAT EXCHANGERS TO ASSURE OPTIMUM COOLING

Young standardized shell and tube heat exchangers are quality-built to control fluid temperatures and protect costly hydraulic equipment. For example, tubes are braised to tube sheets which, in turn, are braised to the shell to eliminate leakage between hydraulic fluid and coolant. Tube and baffle spacing are engineered to provide maximum heat transfer with minimum pressure drop. Immediate shipments can be made from stock. Catalog sent upon request.

YOUNG RADIATOR CO.

Heat Transfer Products for Automotive and Industrial Applications. Heating, Cooling, and Air Conditioning Products for Home and Industry.

Dept. 322F • RACINE, WISCONSIN
Factories at Racine, Wisconsin and Mattoon, Illinois

lith greases, explains how they withstand both high temperatures and wet operating conditions. Discusses two grades—one recommended for central dispensing systems, and a heavier grade for compression cups or pressure gun. Standard Oil Co. (Ind.)
See ad on page 51 for information on a multi-purpose oil.

273 Lubrication of Diesel Engines—An excellent instruction manual, 50-pp Technical Bulletin B-1 (revised) also provides a brief history on diesel engines, an explanation of the fundamentals of design and the common types of diesels and their advantages. Explains combustion process, discusses modern fuel injection systems. Cylinder and bearing lubrication are treated in detail and recommendations given for lubricating oils. There's also a chapter on diesel fuels. Sun Oil Co.
See ad on page 127 for information on lubrication of presses.

"After this job, what d'ya say we take a nice long vacation, Joe?"

274 How Lubricators Helped—Blueprint 106 is an industrial case history telling how die life was greatly increased and other wire forming operations improved by use of manufacturer's die lubricator. Includes operating and installation data. C. A. Norgren Co.
See ad on page 157.

DUST CONTROL

276 Industrial Dust Control—In addition to citing several examples of how company's Dustube collectors are solving the dust control problem in different industries, Vol. 1, No. 1 of Industrial Ventilation explains merits of cloth filtration. American Wheelabrator & Equipment Corp.
See ad on page 61.

277 Dust Control—Bulletin 98 explains value of industrial dust control and principles of dust suppression, collection by filtration. Describes dust control equipment, providing specifications, dimensions on filters, systems, automatic controls. The W. W. Sly Mfg. Co.
See ad on page 21 for information on a cloth screen dust collector.

PUMPS AND COMPRESSORS

278 Centrifugal Pump Care—Sixteen-pp Bulletin 08X6256A is a handbook on the care of all makes of centrifugal pumps. Tells how to figure head, determine friction loss. Discusses causes of troubles and their cures, includes maintenance time table. Tells how to prevent cavitation, common mistakes in packing stuffing boxes. Allis-Chalmers Mfg. Co.
See ad on pages 24-25 for information on unit substations.

279 Condensation Return Units—Bulletin 113-ST describes and illustrates packaged condensation return units for small, low pressure uses, covering pump capacities of 1½ to 22½ gpm. Aurora Pump Co.
See ad on page 194.

280 Rotary Pump Service Manual — Although written for users of company's

A SHUTOUT

...that saved BRIGGS STADIUM from loss by Moisture Damage

AN IMPORTANT SHUTOUT

was scored for Briggs Stadium—home of the Detroit Tigers Baseball Club—by the TREMCO MAN. Water infiltration had already caused concrete spalling, cracked and crazed walls and rusting of reinforcing rods. Considering existing conditions and desired appearance, Tremco 101 Mastic was selected to protect, preserve and beautify.

END TO MOISTURE TROUBLES

Quickly applied by brush and spray, Tremco 101 Mastic forms an elastic impervious coating. It becomes a seamless seal that expands and contracts with temperature changes—completely shutting out driving rain. Applied over brick, concrete, stucco, stone and other surfaces, Tremco 101 Mastic does not become brittle, peel, crack or sag.

PROTECTS, PRESERVES and BEAUTIFIES

Furnished in a selection of colors, Tremco 101 Mastic both beautifies and seals in one application and lasts for years. *The Tremco Man* has experience in sound techniques for low-cost prevention of moisture infiltration. He is qualified to recommend the best material and method to cut maintenance of your buildings. Call or write. No obligation. The Tremco Manufacturing Company, Cleveland, Ohio or The Tremco Manufacturing Company (Canada) Ltd., Toronto.

TREMCO

PRODUCTS AND METHODS FOR BUILDING MAINTENANCE

UM-1018

when
you
replace
. . . ***improve*** !

Install a complete new set of

Gilmer V-BELTS

You can replace *any* standard-size V-belt with a ruggedly built, long-wearing GILMER V-Belt . . . or matched set! Just give your Gilmer Distributor the make and number of the old belt. He can quickly provide the corresponding GILMER number. He has the belt in stock . . . or can get it for you promptly from a nearby Gilmer Warehouse.

In a multiple V-belt drive, when you replace *all* belts at the same time (saving the old ones for later replacements) it's wise to replace with a matched set of GILMER V-Belts — designed and built by *belt specialists* to perform best under the widest range of drive conditions.

GILMER HAS THE *PULL!*

L. H. GILMER COMPANY
Division of United States Rubber Company
501 Tacony, Philadelphia 35, Pa.

BUY THROUGH YOUR GILMER DISTRIBUTOR

own rotary pumps and including a parts list, this little 20-pp booklet contains tips on installation and care applicable to practically all pumps of this type. Covers mounting, pipe connections, suction lines, pipe sizes, strainers, discharge lines, power, relief valves, speeds. Provides pointers on noisy operation, rapid wear, decreased capacity, loss of suction. Viking Pump Co. *See ad on page 198 for information on pump design features.*

281 **Close-Coupled Pumps**—Revised Bulletin 710-1, 12-pp, covers manufacturer's Close-Coupld centrifugal pumps of the single-stage enclosed impeller type. General construction details of these compact, easily installed pumps are described, illustrated by cutaway drawings. Specifications, performance data and dimensions given. Goulds Pumps, Inc. *See ad on page 144 for information on a support-head type pump.*

282 **Centrifugal Pumps**—Twenty-pp Bulletin CT50 presents pump specification and cost information in table form; includes a selection table for both belt driven and direct connected centrifugals. A clear cross section with notations shows engineering features of the manufacturer's line. Includes engineering and pump data along with formulas and conversion tables. The F. E. Myers & Bro. Co. *See ad on page 201.*

283 **Compressor Selection Chart** — Based on normal applications handling air with atmospheric intake pressure, this chart simplifies selection of proper size compressor, giving quick comparison between discharge pressure pounds per square inch gage and piston displacement cubic feet per minute. The chart shows recommended compressor bore and stroke in inches. Worthington Corp. *See ad on page 70.*

Two postage-free cards make it easy for you to order any of this literature. You'll find the cards on the green pages, 37-38 and 171-172.

284 **Multi-Stage Compressors** — Featured in 36-pp Bulletin 116 is a presentation of engineering data and performance characteristics to enable plant engineers to approximate power requirements, rotative speed and discharge temperature for most multi-stage centrifugal compressor applications. Clark Bros. Co., Inc. *See ad on page 39 for information on company's balanced-opposed compressors.*

285 **Air Compressor Selection Data**—Factors to be considered in selecting a compressor are discussed and selector charts provided in 20-pp Bulletin IDC 9302-3, covering manufacturer's Y and G air compressors. The Y line includes tank mounted and bedplate units, single- and two-stage types. Special features of each model are described, dimensions and ratings given. Westinghouse Air Brake Co. *See ad on page 151.*

PACKINGS, GASKETS, SEALS

287 **Metallic Packing**—This folder is devoted to company's elastic metallic packing intended for frictionless operation by means of an oil seal. Photos and text tell how seal is constructed, operates and is used. A. W. Chesterton Co. *See ad on page 176 for information on other packing.*

288 **Long Wearing Piston Packing** — Form 4502, 8 pp, presents composition cups for packing pistons of air and hydraulic cylinders and reciprocating pumps. Engineering information covers properties, textures, temperature and pressure data, sizes. Darling Valve & Mfg. Co. *See ad on page 60.*

289 **Buyer's Guide on Packings**—Twenty-pp Catalog PC-101 brings together all material on company's Palmetto packings and includes data on packing for liquid pistons on inside-packed piston pumps. Greene, Tweed & Co. *See ad on page 186.*

LESS LIFTING TIME . . .
MORE FOR PRODUCTION

Want greater output and lower costs? You get both with the 'Budgit' Electric Hoist! This powerful hoist speeds lifting — gives workers extra time to produce more. Women and older men — now helping turn out defense and civilian goods — praise its easy, safe, one-hand operation. And, the 'Budgit' works all day for pennies.

The portable 'Budgit' is a hang-up, plug-in hoist — ready for service as soon as unpacked. No extras to buy. No installation costs. Capacities: 250 to 4,000 lbs. A.C. and D.C. models. Priced from $119. Get all the facts. Send for Bulletin 391.

A 'BUDGIT' I-BEAM TROLLEY makes any hoist more useful. Tough steel construction. Ball-bearings in wheels. Adjustable to fit several I-Beam sizes. Capacities: 500 to 4,000 lbs. Prices from $13.50. Write for Bulletin 390.

'Budgit' ®
ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

CUT HANDLING COSTS

WITH Weld-Bilt MATERIALS HANDLING EQUIPMENT

Your investment in Weld-Bilt materials handling equipment will bring you 4-way savings:

- ✔ 1. Original cost and maintenance,
- ✔ 2. Reduced wear and tear on floors,
- ✔ 3. Avoid product damage,
- ✔ 4. Increased manpower efficiency.

These savings result from correct engineering, rugged durability and built-in strength that you can actually SEE in all Weld-Bilt Equipment.

PLATFORM TRUCKS
Spring-Bearing equipped for product protection and easy moving over rough floors.

PALLET-TYPE HYDRAULIC LIFT TRUCKS
Save time in handling single, double-face pallets up to two tons.

TWO-WHEEL HAND TRUCKS
Spring-Bearing equipped to save on floors and truckers.

HYDRAULIC LIFT TRUCKS
Built for easier, faster moving, effortless operation.

SKID PLATFORMS
Standard and special designs for all needs. Extra-strong REPLACEABLE floors.

PORTABLE ELECTRIC ELEVATORS
for space-saving storage.

Write or wire for prices today . . . or for engineering assistance on your handling problems or plans.

WEST BEND EQUIPMENT CORPORATION
Materials Handling Engineers
304 Water Street • West Bend, Wisconsin

PELZER MILLS ADDS NEW HORTON TANK

DEEP in the heart of the Carolina cotton country is another shining example of modern water storage facilities—a new Horton elevated water tank. It was recently installed at Pelzer Mills, Pelzer, South Carolina, to provide employees' homes with more water for domestic use and fire protection.

As a large producer of cotton sheeting, tobacco cloth, broadcloth, diaper, poplin, and print cloth, Pelzer Mills depends on modern, dependable methods in all their operations. That's why Horton elevated storage was chosen.

A Horton elevated tank assures better water service because gravity pressure does the work. Mechanical failures and power shutdowns do not interrupt the water supply. This dependability often results in lower fire insurance premiums.

Horton elevated water tanks with ellipsoidal-bottoms are built in standard capacities from 15,000 to 500,000 gals., and radial cone designs in standard sizes from 500,000 to 3,000,000 gals. Horton Waterspheres are built in capacities from 25,000 to 250,000 gals.

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Detroit 26 ..... 1569 Lafayette Building
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Houston 2 ..... 2166 C & I Life Building
Los Angeles 17 ..... 1574 General Petroleum Building
New York 6 ..... 3317—165 Broadway Building
Philadelphia 3 ..... 1649—1700 Walnut Street Building
San Francisco 4 ..... 1582—200 Bush Street
Seattle 1 ..... 1370 Henry Building
Tulsa 3 ..... 1669 Hunt Building
Washington 6, D. C. ..... 1130 Cafritz Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE

In Canada: HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

LIKE AN
ATOM-IC
EXPLOSION

Just 1/32" (pinhole size) faucet leak
MUSHROOMS into ATOMIC WASTE
of approximately 95,000 gallons
of water yearly—costing:
$24.14
@ $1.90 per M cubic feet

If a hot water faucet, then (actual) FUEL WASTED heating 95,000 gallons costs approximately:

$88.91 if coal (8879 lbs.)
$91.08 if oil (702 gals.)
$84.41 if gas (84,411 cu. ft.)

Above figures authenticated by Hackensack Water Co. and American Gas Association.

STOP this needless WASTE during today's MATERIAL and MANPOWER shortages with "SEXAUER" "Easy-Tites" that outwear ordinary faucet washers 6-to-1, thus SAVING labor on 5 REPEAT repairs, PLUS water and fuel, while prolonging the life of SCARCE fixtures.

PAT'D.
"EASY-TITE"
FAUCET WASHERS

...a modern laboratory triumph, are compounded from du PONT NEOPRENE (tested up to 300°F.) instead of rubber—to withstand DESTRUCTIVE HEAT common in present-day superheating water systems—that formerly broke down washer's structure.

Built like a tire with fabric re-inforcement they resist the grinding, closing squeeze that SPLIT and MUSH ordinary washers out of shape...causing LEAKS.

Through combining NEOPRENE and FABRIC RE-INFORCEMENT they OUTWEAR ordinary washers 6-to-1 on hot or cold FAUCETS—thus you slash water, fuel and labor costs.

THE NEW 'SEXAUER' CATALOG

Edition G, just out, pictures over 2500 TRIPLE-WEAR plumbing REPAIR parts and Pat'd. Precision Tools. It's today's accepted buying guide for discriminating purchasing and maintenance personnel among thousands of top PLANTS, INSTITUTIONS and GOVT. AGENCIES that rely on SEXAUER repair materials. Send for your copy today!

Then too, there's a SEXAUER TECHNICIAN within quick call from coast-to-coast, who offers a special SURVEY service that sets up a schedule of the exact replacement parts required for your particular plumbing fixture regardless of make or age and *without obligation.*

A postcard will bring him and your NEW Catalog promptly.

J. A. SEXAUER MFG. CO., INC., Dept. S-62
2503-05 Third Avenue, New York 51.

as advertised in the SATURDAY EVENING POST

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

290 **Seals for Bearings** — Complete information on manufacturer's Klozure oil and grease seals for bearings is available in 100-pp Catalog 10. Fully illustrated with color, pictures all types of these seals, typical applications and gives list of sizes and part numbers. Also describes mechanical pressure seals for rotary shafts. The Garlock Packing Co.
See ad on page 162 for information on expansion joints.

291 **Data on Packings**—Form 428 is a collection of bulletins on flexible metallic packing, semi-metallic packing, rotary mechanical seal, oil pressure system and steel packing tools. Durametallic Corp.
See ad on page 190.

VIBRATION CONTROL

292 **Simplified Isolation** — A simplified method of machine isolation which utilizes pads and cement is described in this small folder. Explains how it reduces maintenance cost, can be used for complete plant installations. The Felters Co.
See ad on page 167.

293 **Vibration Control**—Advantages and limitations of spring mountings, rubber mountings and cork materials in the control of vibration, together with data on their use are given in Bulletin G-102. Loading ranges given. Korfund Co., Inc.
See ad on page 152.

294 **Easier Machine Installation**—Bulletin 415 describes low cost machine mountings that simplify machine installation control vibration, reduce noise and absorb impact. The MB Mfg. Co., Inc.
See ad on page 194.

INSTRUMENTS, CONTROLS

296 **Wide Range Regulator**—Featured in Bulletin 316 is an expansion stem type temperature regulator operated by water or compressed air. Explains how regulator works. The Powers Regulator Co.
See ad on page 198.

297 **For Spotting of Overhead Loads**—Bulletin 921-A on magnetic crane controls for d-c cab-operated cranes lists standard features for crane-hoist service and bridge or trolley service. Explains time-current method of acceleration, operating principle of Wright dynamic lowering circuit controller. The Electric Controller & Mfg. Co.
See ad on pages 62-63 for information on overload relays.

298 **Time Saving Volt-Ammeter**—Manual 110, 16 pp, "How to Make Your Job Easier with the Amprobe," describes the handiness of this pocket-size volt-ammeter in installing, repairing, servicing electrical equipment. Pyramid Instrument Corp.
See ad on page 119.

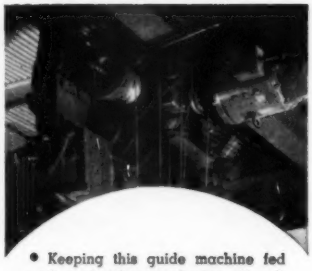
Keep Your Copy Intact

Readers wishing tear sheets of any article appearing in the issue for their personal file may obtain them by indicating the item desired on one of the post cards appearing in this issue. — Editors

299 **Electrical Instruments** — A line of instruments for production testing, plant maintenance and service is shown in 16-pp Bulletin A-16-B. Among these are a-c clamp volt ammeters and a-c clamp ammeters, circuit testers, analyzers, mutual conductance tubechecker, pocket-size meters. Weston Electrical Instrument Corp.
See ad on page 140.

MATERIALS *Handling* IDEAS

ALL MOTIONS MOTORIZED
To Reduce Costs



• Keeping this guide machine fed with steel strip was always a "touch and go" proposition requiring the attention of several men. To reduce handling costs and speed output, a new idea was tried: a one-ton, single I-Beam Reading Electric Crane, with *all* motions motorized, was custom-built for the job. Now the entire operation is under the thumb of one man—all he does is push the right button on the control pendant.

Modern materials handling is working wonders in reducing production costs these days. Chances are, a Reading Engineer can suggest ways to do the same in your plant if you give him the opportunity to personally analyze your operations. Simply drop us a line—there's no obligation.

READING CRANE & HOIST CORPORATION
2103 ADAMS ST., READING, PA.

CHAIN HOISTS • ELECTRIC HOISTS
OVERHEAD TRAVELING CRANES

READING CRANES

300 Fundamentals of Instrumentation—Booklet 80-2, just released, offers 126 pp of information on instrumentation in industry. Separate sections are devoted to the fundamentals of measurement and control, measurement of process variables, remote transmission of measurements, automatic controllers, power units and final control elements, control systems and panelboards. Typical applications are also discussed. Illustrated. Available to qualified plant engineers. Brown Instruments Div., Minneapolis-Honeywell Regulator Co. *See ad on page 153.*

301 Heating-Air Conditioning Controls—A complete and informative ordering book for thermostats, motor-operated valves and accessories for heating, ventilating and air conditioning applications is offered in 48-pp Catalog F-1753-3. Compiled to aid in selection of control equipment to meet rigid specifications, book provides application, installation data. Barber-Colman Co. *See ad on page 197 for information on temperature regulators.*

302 For Liquids Worth Storing—Bulletin 6405 offers an illustrated discussion of company's self-contained gages for liquid level applications, covering both direct- and remote-reading types, also a dial type hydrostatic gage. Stresses value of measuring stored liquids. Liquidometer Corp. *See ad on page 197.*

WATER CONDITIONING

303 For Conductometric Determination of Solids—A quick and simple method for determining solids content of boiler water or condensate is explained and illustrated in Bulletin 2RE50. Hall Laboratories, Inc. *See ad on page 57 for information on boiler water conditioning service.*

304 Hydrogen Zeolite Softeners—Publication 4530, 16 pp, presents hydrogen zeolite (cation exchange) water softening equipment. Gives a complete description of the process and the field of application, showing advantages. Cochrane Corp. *See ad on page 192 for information on a condensate return system.*

MECHANICAL POWER TRANSMISSION

306 Power Drive Handbook—Catalog 709, describing roller chains and sprockets, includes tips on selecting stock roller chains for every type of power drive service. Diamond Chain Co., Inc. *See ad on page 14.*

307 Blocks and Sheaves—Catalog 300-24 24 pp, covers manufacturer's complete line of blocks and sheaves. Provides block number, capacity in tons, number of sheaves, rope size and weight of each block. Illustrations, ratio table included. American Hoist & Derrick Co. *See ad on page 196 for information on car pullers.*

308 Belts to Suit the Job—This bulletin presents company's "inner-locked" woven duck belting available in types for general elevating and conveying and general power transmission applications as well as special jobs. Imperial Belting Co. *See ad on page 186.*

309 Variable Speed Control Simplified—Bulletin 700 contains some 40 pp of descriptive, application and engineering data on variable speed pulleys and selective speed transmissions. Illustrations show how old and new machines can be equipped with efficient variable speed control. Lovejoy Flexible Coupling Co. *See ad on page 195 for information on flexible couplings.*

310 Manual on V-Belt Drives—Catalog 280 is pocket-sized, but contains 384 pp of illustrations, tables and other technical information to make it possible to select V-belts for any power transmission drive quickly and accurately. List prices, dimensions included, also a 12-pp supplement on cog belt drives. The Dayton Rubber Co. *See ad on page 129.*

311 Fluid Power Circuits—The "Circuit Rider" is a 32-pp pocket-size man-

NEW smoothness... NEW efficiency in powder-actuated fastening...

Ramset JOBMASTER

ANOTHER RAMSET FIRST
Designed BY Operators FOR Operators

SEE THESE NEW FEATURES:

- 1-PIECE TOOL, for faster loading
- TRIGGER ACTION, for easy operation
- PORTED BARREL, to reduce spall
- ANGLE-FIRE CONTROL, for straight penetration
- VISI-CHEK BUTTON, for quick inspection
- Plus exclusive, proved-in-use ROTO-SET SAFETY SHIELD, for accurate positioning

Faster, lighter, easier handled, the new RAMSET JOBMASTER sets a record pace for steel and concrete fastenings. Properly trained workmen quickly become skilled operators because of smooth, simple, natural motions of loading, placing, firing. Positive controls bring improved accuracy and efficiency . . . and still lower fastening costs. Ask your dealer for demonstration of how RAMSET'S years of pioneering have made the new JOBMASTER the proved-in-performance leader.

Ramset Fasteners, Inc.
12117 BEREA ROAD • CLEVELAND 11, OHIO

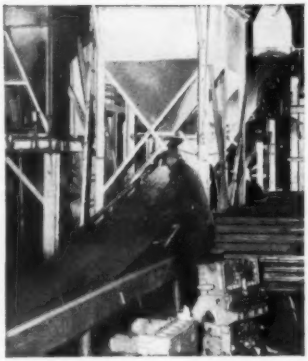
Product Patent No. 2470117. Other Patents Pending.

Ask for Demonstration TODAY!

NASH TESTS COMPETITIVE BELTS by piecing sections together

. . . and Imperial Rexall outwears all the others

Several years ago Nash Motors of Kenosha wanted to determine the best belt to use on the conveyor pictured here. So they pieced together several competitive brands and ran this combination belt in actual service for months. Standard Rexall showed such superior resistance to the tough wear of rough abrasive metal that it easily won this test and has since been used continuously on this conveyor. This belt is 30" x 6-ply, 615 feet long. It handles cores, rods, scrap, sand, shot and other refuse.



Job-Designed Belting

Standard Rexall is tightly woven from finest 37½-ounce silver duck. Plies are double-stitched with inner-locking stitches which positively prevent ply separation. The belt is saturated with special impregnating compounds to condition it for the service in which it will be used. Standard Rexall is ideal for conveying metal parts, castings, metal scrap, heavy boxes, crates and bags . . . and for conveying and elevating bulk materials such as clay, sand, coal, etc. It has a very low coefficient of sliding friction.

For new installations or replacements, there's an Imperial Belt that will cut your handling costs. Write for Data Sheet 51-9 and prices.

Imperial BELTING CO.
1759 S. Kilbourn Ave., Chicago 23, Ill.

• ENGINEERED BELTING—THE RIGHT BELT FOR EACH JOB •

PALMETTO CUTNO® and a DeLaval IMO *team up to resist caustic bite for American Viscose Corp.*

In the busy Nitro, W. Va., plant of American Viscose Corporation alkalis behave when Palmetto and DeLaval are called upon for service.

A DeLaval Rotary Pump — type IMO — packed with Palmetto Cutno handles caustic soda — carbon bisulphide at 55 F, and 95 psi at variable speeds between 178-355 rpm. A great pump and a great packing mated for efficient economical operation.

Palmetto Cutno, the *standard* anti-alkali packing, resists caustics in all concentrations — all temperatures. Its special lubricant-compound cannot "soap out" because it does not saponify . . . and like in all other Palmetto Self-Lubricating Packings, each individual strand is impregnated with the lubricant *before* the packing is constructed.

Write for PC-101 . . . the catalog that describes all Palmetto Packings in detail.

PALMETTO Packings

packing more performance into every application

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NORTH WALES, PENNSYLVANIA

ual presenting a discussion of basic designs in fluid power circuits together with drawings. Covers air, hydraulic and combination circuits, includes illustrations of JIC symbols. In preparing this manual, company has endeavored to provide a down-to-earth explanation of representative types of fluid power circuits and to show the many possibilities afforded through the use of different types of circuit designs. Logansport Machine Co.
See ad on page 199.

312 V-Belt Drive Design Book—Providing 54 pp of engineering data on manufacturer's Bull Dog belts, this catalog gives general drive information as well as simplified methods of selecting V-belt drives, V-flat drives and several types of non-standard drives. Includes selection tables, dimensions and list prices. Boston Woven Hose & Rubber Co.
See ad on page 66 for information on flexible steam hose.

313 Improved V-Belts — This literature on company's Vulco rope drives explains how this rope with concave sides is designed to fill out to a precise fit in the sheave groove, to provide less wear, more pulley contact and more sure power when needed. The Gates Rubber Co.
See ad on page 11.

314 Brakes and Brake Motors—Construction advantages of company's brakes are featured in illustrated Bulletin SL-610-1 on brakes and brake motors. Dimensions, mechanical and electrical characteristics. Crocker-Wheeler Div., Elliott Co.
See ad on page 43 for information on protected type motors.

STEAM GENERATORS

316 Re-Circulation Steam Generator — Here's a 6-pp folder introducing a controlled re-circulation steam generator, describing its developments and uses. Combustion Engineering-Superheater, Inc.
See ad on page 155.

See pages 37-38 and 171-172 for postage-free cards. Use them to request catalogs . . . just list item numbers of all those you'd like to have.

318 Packaged Steam Generators — This new 16-pp booklet on steam generators is profusely illustrated in color, providing photos, cut-away and schematic drawings and describing in detail the construction and operating principles. Explains induced draft, dry steam, four-pass downdraft design, 5 sq ft of heating surface per Bhp, flexibility of operation, and oil, gas and combination gas-oil burning equipment. Superior Combustion Industries, Inc.
See ad on page 170.

319 Steam Generators—Bulletin 1218 on company's Powermaster units for steam or hot water use. Describes high or low pressure units from 15 to 500 hp. Gives details on special burner design and units' ability to be changed from oil to gas firing in minutes. Orr & Sembower, Inc.
See ad on page 137.

VALVES, TRAPS, PIPING AND ACCESSORIES

321 Iron Body Gate Valves—Bulletin 805, 8 pp, covers company's popular iron body, bronze trim gate valves in both outside screw and yoke and non-rising stem types, telling best applications for each. Design features explained. The Ohio Injector Co.
See ad on inside front cover.

322 How to Install, Maintain Traps — Form 1722 is an 8-pp illustrated instruction folder covering use of company's traps. Installation section covers location of traps, hookups, bypasses, use of strainers, other factors to be considered. A chapter on trouble shooting includes discussion of common troubles as well as mysterious ones. Armstrong Machine Works.
See ad on page 5.

the case of the frantic foreman

Poor Mac! Got so he couldn't even check the time sheets without blowing his top, on account of all the noise and confusion around his desk.

All this was B.P. (Before Partitions). Now Mac has an office of his own. Lots quieter. Lots calmer.

Gives him more prestige, too. He can do his paper work and still keep an eye on the shop.

He's the "friendly foreman" now.

Building good partitions in a hurry is one job you can get done at moderate cost with Masonite Presdwood®. These large, strong hardboard panels go up fast, stay put. Easy to take down, too, when you're changing the layout. You can leave them in their natural color or finish them in paint or enamel. Hard, smooth, grainless, they resist surface wear and abrasion.

Your local building materials dealer is the man to see for the 23 types and thicknesses of versatile all-wood Masonite Presdwood. For complete information, write—

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Dept. PE-6, Box 777, Chicago 90, Ill.

"Masonite" signifies that Masonite Corporation is the source of the product

BETTER HARDBOARDS FOR BETTER MAINTENANCE

THIS IS LOW COST WELDING!

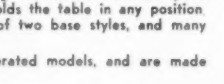
When a touch on a button moves weldments like these into the correct, most convenient position for a downhand pass, you get more arc time, more welding at lower cost. C-F power operated Positioners, rotate the work in a full circle at any point in a range of 135° from the horizontal—giving welders a choice of an infinite number of downhand welding positions instantly.

Every requirement for faster, better positioned welding—constant or variable speed table rotation, full 135° tilt, self-locking gearing which holds the table in any position, oversize built-in main tilt and rotating bearings, choice of two base styles, and many other features—are built into C-F Positioners.

C-F Positioners are available in Hand or Power operated models, and are made in capacities up to 30,000 lbs. and larger.

Write for the new C-F Positioner Catalog

CULLEN-FRIESTEDT CO.
1317 S. Kilbourn Avenue Chicago 23, Illinois



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Cut "TOOL FAG" ... Improve Production WITH Mall FLEXIBLE SHAFT MACHINES

Grinding

Sanding

Polishing

Wire Brushing
And Many Other Applications

Variable Speed and Direct Drive Models.

For grinding, snagging, sanding, and dressing castings in foundry or machine shop, you'll find no handier, speedier, easier-to-operate equipment than MALL Flexible Shaft Machines. The operator enjoys utmost freedom of movement with the caster-fitted rolling motor pedestal. And far less weight to carry than tools equipped with built-in motors. Result — less user fatigue, fewer rejects, better production.

MORE POWER TO THE POUND
LESS POUNDS TO HANDLE

40 Factory-Owned Service Warehouses, Coast to Coast, To Serve Our Customers and Thousands of Dealers.

Write for illustrated bulletin No. 430 and name of your nearest MALL Dealer.

Mall TOOL COMPANY
7709 S. Chicago Avenue
Chicago 19, Illinois

Clip and mail this CHECK LIST for details

323 Steam Trap Reference Manual—Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure traps sizes and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.
See ad on page 72 for information on liquid level indicators.

324 Steam Hook-ups—This 64-pp manual on hook-ups for steam traps, air vents and temperature controls provides diagrams, size calculators, selection data on traps and regulators, properties of saturated steam, dimensions. Sarco Co., Inc.
See ad on page 195 for information on heating by steam injection.

325 Solving Steam Trap Problems—This popular 36-pp catalog on steam traps contains specifications and capacities on steam traps, float traps, air release valves and pipe line strainers. Tells how to calculate condensation loads and select traps for all classes of equipment, including unit heaters, jacketed kettles, autoclaves, submerged surfaces, steam mains and header drips. Gives pointers on how to install traps and service them. The V. D. Anderson Co.
See ad on page 191.

326 Pipe Insulation—Form 76-102 is a small folder stressing efficiency and economy of Amocel, a lightweight asbestos pipe insulation for temperatures to 650 F. Discusses its low thermal conductivity, high mechanical strength in relation to its weight, and physical stability. Union Asbestos & Rubber Co.
See ad on page 136.

"Well, no, the card we want for our boss in the hospital wouldn't be called a get well card."

327 Design Properties of Pipe—This 12-pp booklet consists of tables listing pipe sizes and wall thicknesses currently established as standard, plus what is believed to be the most nearly complete tabulation ever published of dimensional properties of commercial steel pipe. Tube Turns, Inc.
See ad on pages 19-20.

328 Piping Pointers—This is company's popular piping manual covering fundamentals of sound piping practices. Discusses various types of valve designs and how each should be used. Pictures and names more than 80 kinds of fittings and contains many illustrated how-to-do-it features. Included with the manual is an 8-pp valve selection guide. Crane Co.
See ad on page 121 for information on diaphragm valves.

329 Manifold Discharge Piping Application—Manual 51-B, 34 pp proposes an approach to design of discharge header systems based on partial or complete elimination of back-pressure effects on tied-in

Me...an AIRCRAFT Engineer? And live in California, too?

Yes, LOCKHEED CAN TRAIN YOU—AT FULL PAY!

A great new career can be yours—as an Aircraft Engineer at Lockheed, in Southern California.

The step up to Aircraft Engineering—and better living in California—isn't as steep as you might expect. Lockheed takes your knowledge of engineering principles, your experience in other engineering fields, your aptitude and adapts them to aircraft work.

ENGINEER TRAINING CENTER—An Engineer Training Center helps you convert to Aircraft Engineering quickly, easily, at full pay. Top engineers teach you "the language." You learn to work with closer tolerances, you become more weight-conscious. You may attend classes in the Training Center for three days—or six weeks. It depends on your experience and background. But, always, you receive full pay.

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YOUR CAREER GOES UP—Lockheed's policy of developing its own executives gives you a head-start toward management posts. Under this program, Lockheed holds management-training classes on company time and Lockheed also helps you advance your education at major universities in the Los Angeles area. The result: 95% of all Lockheed management openings are filled by promotions from within the plant.

What's more, Lockheed has augmented top pay with a far-reaching system of employe benefits. An outstanding retirement plan, low cost insurance, social activities are only a few.

BETTER LIVING IN CALIFORNIA—Your way of life improves as well as your work when you join Lockheed. Living conditions are better in Southern California. The climate is beyond compare: cooling breezes day and night in the summer, sunshine in the winter. Golf, fishing, motoring, patio life at home are yours the year 'round. Beaches, mountains are only an hour from Lockheed. And your high Lockheed salary enables you to enjoy life to the full.

NOTE TO MEN WITH FAMILIES: Housing conditions are excellent in the Los Angeles area. More than 40,000 rental units are available. Thousands of homes for ownership have been built since World War II. Huge tracts are under construction near Lockheed.

Send today for illustrated brochure describing life and work at Lockheed in California. Handy coupon at right is for your convenience.

Special courses help you convert to Aircraft Engineering, prepare you for promotion.

Lockheed engineers enjoy swimming and boating at beaches such as Balboa and Laguna.

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Dear Sir: Please send me your brochure describing life and work at Lockheed.

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OTC NEW 30 TON POWER-TWIN hydraulic puller

MAKES TOUGH JOBS EASY

BIG BROTHER TO THE FAMOUS 17½ TON POWER-TWIN

Really dynamite . . . that's the new heavy duty 30 ton Power-Twin Hydraulic Puller . . . light . . . compact . . . has safe remote control operation. The tough new Power-Twin develops 30 tons of power with only 100 pounds of pressure on the pump. It will pull or install bearings, gears, pinions, shafts, studs, wheels, pulleys, etc. Works wonders as a heavy duty jack, spreader, straightener or compressor.

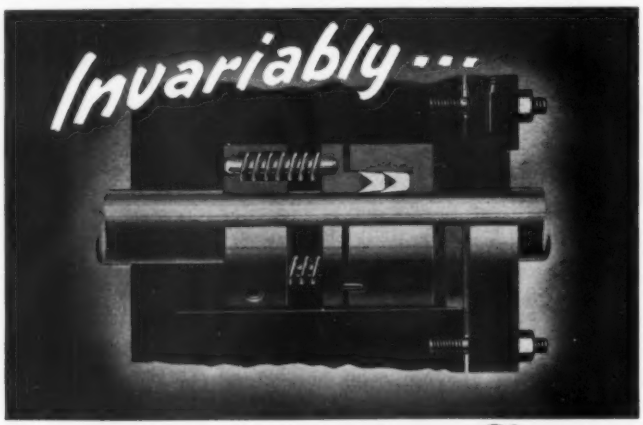
The new 30 ton Power-Twin is a must for those really tough jobs on pumps, diesel engines, heavy machines and machine tools . . . saves hours and dollars on every job. The 30 ton and 17½ ton Power-Twins are the only Hydraulic Rams for which complete assortments and ranges of pullers, attachments and adapters are available.

BOTH HAVE THE FAMOUS CENTER HOLE

Center Hole permits Power-Twins to do jobs thought impossible . . . unlimited adjustment . . . eliminates torque, friction . . . versatile interchange of parts.

See your jobber for complete information or write us . . . today.

OWATONNA TOOL COMPANY
446 CEDAR STREET • OWATONNA, MINNESOTA



. . . invariably it's DURA SEAL
ROTATES WITH THE SHAFT

for long dependable service

WHERE
. . . . ECONOMICAL OPERATION IS DESIRED
. . . . OPERATING CONDITIONS ARE HAZARDOUS
. . . . LOSS OF COSTLY FLUIDS MUST BE PREVENTED
. . . . COMPLETE AND PERFECT SEALING REQUIRED

GET THE "DURA SEAL" STORY—WRITE FOR BULLETIN 174PL

DURAMETALLIC CORPORATION
KALAMAZOO • MICHIGAN

safety-relief valves. This principle is claimed to offer great savings in cost of discharge piping. Farris Engineering Corp. *See ad on page 46 for information on flexible valves.*

330 Strainers and Separators — Bulletin R-46-50A is a 16-pp catalog on T-type strainers, suction strainers, multi-flow and receiver separators. Contains dimensions, prices. American District Steam Co. *See ad on page 31 for information on instantaneous heaters.*

331 Threadless Bronze Fittings—A fitting designed to improve copper and brass piping is described in this illustrated bulletin. This is a threadless bronze fitting with brazing alloy (company's Sil-Foe) incorporated as a ring in the port openings. Stresses strength of joint. Walworth Co. *See ad on page 166 for information on cast steel gate valves.*

332 Handbook on Fittings, Flanges — Catalog wf-1950, 68 pp offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure ratings, physical and chemical requirements. Grinnell Co., Inc. *See ad on page 67 for information on adjustable pipe hangers.*

REFRACTORIES, INSULATION

334 Rugged Refractories—Form 5120 is a 12-pp illustrated booklet explaining characteristics of several high quality refractories and telling what each is best suited for. Not an ordering book, covers silicon carbide types, electric furnace mullites, electrically fused alumina refractories and fused cast refractories, discussing their heat resistance, heat conductivity, chemical inertness, resistance to abrasion, spalling, thermal shock. The Carborundum Co. *See ad on pages 26-27.*

335 Heat Insulation—This 8-pp booklet on hydrous calcium silicate insulation is illustrated with graphs, tables and drawings showing numerous ways this insulation is used in industrial and commercial projects for temperatures up to 1200 F. Lists the wide selection of shapes and sizes available to insulate tubes and pipes from ¼ to 72 in. dia and vessels from 72 in. to 60 ft, also flat surfaces. Also gives data on physical characteristics, thicknesses. Kaylo Div., Owens-Illinois Glass Co. *See ad on page 109.*

336 Fiberglas Bibliography—This is the new, 88-pp third edition of a volume of annotated references to selected articles on Fiberglas products which have appeared in the nation's press. Uses of Fiberglas products documented in the book include such applications as refrigerating equipment, water heaters, forced warm air furnaces, reinforced cable, storage batteries. Owens-Corning Fiberglas Corp. *See ad on page 135 for information on Fiberglas air filters.*

HEATERS, HEATING

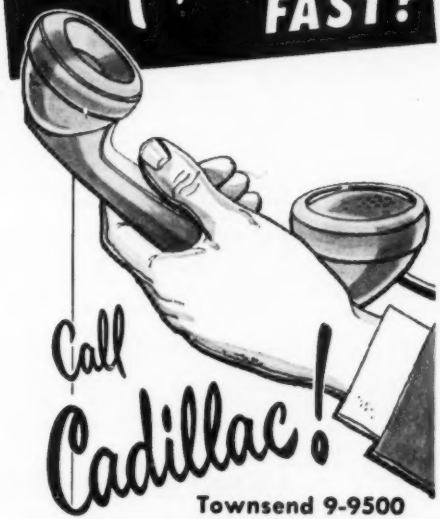
337 Propeller Fan Unit Heaters—Twelve-pp Bulletin 1301 shows how unit heaters can solve many a space heating problem. Both horizontal discharge and vertical discharge units are covered, and outstanding construction features detailed. Suggestions on where to place heaters provided, also basic steam and hot water capacity data, conversion factors. C. A. Dunham Co. *See ad on page 161.*

338 What Unit Heaters Can Do — Featuring many photos showing how unit heaters are being used to provide heating comfort, cut fuel costs, provide economical air circulation, 8-pp Bulletin 149-A discusses advantages of these heaters and includes condensed performance data. Modine Mfg. Co. *See ad on page 175.*

COOLING

339 Jacket Water Coolers — Illustrated Catalog 1351 describes a line of engine jacket water coolers described as extremely rugged units capable of withstanding abuse of portable equipment installations. Details new design features of the units. Young Radiator Co. *See ad on page 180.*

NEED Plastics FAST?



Call Cadillac!

Townsend 9-9500

We pride ourselves on serving customers f-a-s-t! In fact, our business has been built on just such service.

If your requirements call for plastics—and you need them in a hurry—give us a call! We can supply you with plastics, dyes and adhesives for re-use or fabrication, and in quantities to fit your needs . . . promptly and at low cost.

Inventory price lists for No. 1 and No. 2 grades on request.

AMERICA'S LARGEST WAREHOUSE STOCKS

PLEXIGLAS · VINYL · LUCITE
ACETATE · OTHERS
SHEETS—RODS—TUBES

Cadillac Plastic Co.

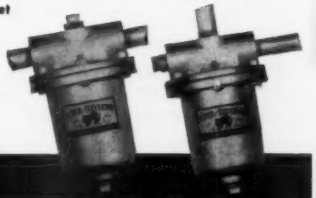
VALUABLE MAN-HOURS ARE *LOST* by old style STEAM TRAP PIPING

Man-hours lost by old style steam trap piping, are costly. That's why hundreds of manufacturing plants are switching to Super-Silvertop Steam Traps. Three pipe connections in the head saves up to 50 minutes installation time and as many as 7 fittings. Since Super-Silvertops can be serviced without removing the trap from the line, 30 minutes time can be saved whenever you inspect or service your trap. Because Super-Silvertop valve and seats are made of longer lasting Anderloy and because the bucket is guided on a center tube eliminating bucket damage, trap failures and replacements are few and far between.

Don't be troubled with frequent servicing of steam traps. Don't waste precious man-hours. Send for your copy of "Solving Steam Trap Problems" today and see how Anderson Super-Silvertop Steam Traps reduce LOST MAN-HOURS.

THE V. D. ANDERSON COMPANY
1939 West 96th Street
Cleveland 2, Ohio

USE STRAIGHT-IN-LINE OR AS AN ELBOW



SUPER-SILVERTOP STEAM TRAPS
SILVERTOP AIR RELEASE VALVES
STRAINERS
Hi-eF PURIFIERS

340 Industrial Dry Coolers — Illustrated Bulletin DC-50, 12 pp, presents dry cooling equipment for small, "in-between," and heavy-duty cooling jobs and includes three recent models. Two are small "portable" units and the third a medium-size unit. Although designed primarily for cooling engine jacket water, they can be used for cooling natural gas, lube oils, fluids of refining stages. The Marley Co., Inc.
See ad on page 169 for information on cooling tower drive shafts.

SAFETY, SANITATION

341 Dry Chemical Extinguishers — New quick-acting fire extinguishers of the dry chemical type in 20 and 30 lb sizes are covered in Form C-104. C-O-TWO Fire Equipment Co.
See ad on page 177.

342 Washroom Layouts — Sixteen blueprint drawings of industrial and institutional washroom layouts are shown in this 12-pp booklet. Provides a general discussion of washroom planning, also roughing-in data. Bradley Washfountain Co.
See ad on page 40 for information on column showers.

343 Protective Creams — This folder describes three creams with antiseptic as well as protective qualities, giving suggestions for use. Includes list of more than 175 hazardous substances, telling which cream offers best protection against each. West Disinfecting Co.
See ad on page 145.

OTHER EQUIPMENT

344 Making Profits from Overhead—Use of overhead space for economical storage room is discussed in Bulletin 31, covering manufacturer's Loadmaster racks. Illustrates four basic types of racks, trucks and stacking units for loading racks. Lewis-Shepard Products, Inc.
See ad on page 47 for information on trucks.

345 Elevated Steel Tanks—Welded steel tanks with ellipsoidal bottoms and roofs are presented in this 24-pp booklet as an economical means of increasing plant water storage capacity, maintaining uniform pressure. Chicago Bridge & Iron Co.
See ad on page 183.

"I see the sardine department is going home a little early tonight."

346 Plumbing and Heating Supplies—Edition F is a 118-pp catalog listing over 2500 repair parts and precision tools for maintenance of all types of plumbing fixtures. Fully illustrated, includes plumbing fixtures. J. A. Sexauer Mfg. Co., Inc.
See ad on page 184 for information on faucet washers.

347 Water, Waste Water Systems — An engineering and construction service for greater efficiency in industrial sewer systems and water systems is described in this bulletin. Discusses facilities for surveying requirements, testing, designing and construction. Pittsburgh Pipe Cleaner Co.
See ad on page 168.

348 Production Control Systems, Procedures—Publication X-1268, 56 pp, details a method of materials control intended to result in a shorter planning cycle while speeding production by eliminating causes of delay on the production line. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.
See ad on page 203.

349 Neoprene Goes to Work — Eight-pp Bulletin A-12 discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemical resistance. Rubber Chemicals Div., E. I. du Pont de Nemours & Co.
See ad on page 150.

350 Steam Condensers—Bulletin 102, 24 pp, is a comprehensive presentation of manufacturer's steam condensers and includes photos of six typical installations as well as a section of engineering data, a discussion of air removal equipment and condenser maintenance. Condenser Service & Engineering Co., Inc.
See ad on page 201 for information on protection for heat exchanger tubes.

351 Welding Electrode Ordering Guide—Pocket-size Catalog R7-7 on electrodes for hard surfacing and for welding stainless alloy and mild steels, includes operating characteristics, current ranges, tensile strengths, polarity. Harnischfeger Corp.
See ad on page 134 for information on pro-heavy-duty cranes.

352 Where Refuse Is Fuel—Presented in 24-pp Bulletin 505 are installations of company's RotoStokers and RotoGrate stokers for use with medium size and larger units burning refuse fuels separately or in combination with coal. Lists many

FAST, UNIFORM HEAT
NO FLASH LOSS
CONDENSATE RETURNED TO BOILERS AT HIGH TEMPERATURE AND HIGH PRESSURE

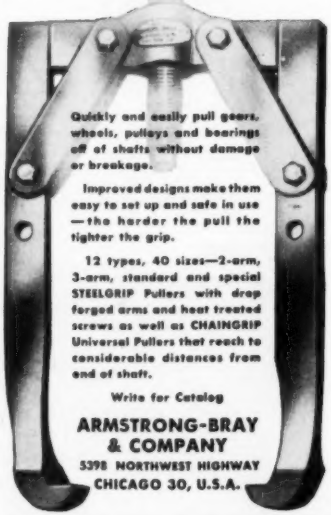
These results are obtainable through the installation of the Cochrane C-B System, a completely closed circuit, with a jet pump and a centrifugal pump incorporated in one, draining hot condensate from steam process equipment and returning it to the boiler at close-to-process temperature and at high pressure.

Savings in fuel, increase in production, improved quality are all immediately obtainable with the installation of the C-B System.

Cochrane Publication 3250 gives complete information on the C-B System. Write for your copy today. COCHRANE CORPORATION, 3126 N. 17th Street, Philadelphia 32, Pa.

COCHRANE
C-B SYSTEM OF CONDENSATE DRAINAGE CONTROL

ARMSTRONG-BRAY
GEAR and WHEEL PULLERS



Quickly and easily pull gears, wheels, pulleys and bearings off of shafts without damage or breakage.

Improved designs make them easy to set up and safe in use—the harder the pull the tighter the grip.

12 types, 40 sizes—2-arm, 3-arm, standard and special STEELGRIP Pullers with drop forged arms and heat treated screws as well as CHAINGRIP Universal Pullers that reach to considerable distances from end of shaft.

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5398 NORTHWEST HIGHWAY
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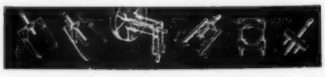
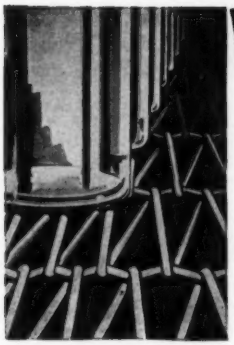




WISSCO BELTS

assure trouble-free production schedules

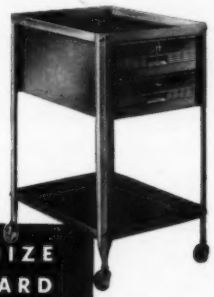
Present-day demands for maximum production call for equipment that can be counted on to stand up and deliver dependable, uninterrupted service—particularly where punishing conditions are encountered.

Wissco Metal Processing Belts are specially engineered in various metals and alloys for long-lasting resistance to abrasion, corrosion and temperature extremes.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION—Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION—Oakland, California
WICKWIRE SPENCER STEEL DIVISION—Clinton, Massachusetts

WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION
CF&I



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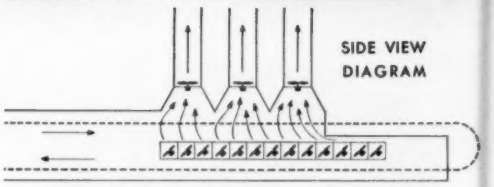
HALLOWELL
CARRY-TOOL

use it anywhere

It's the handiest, most convenient carrier in the shop. Use it on assembly lines, at machines, in the toolroom. Use it for inspection, stockroom, maintenance, and mounting small tools. Roller bearing drawers with padlock attachments are standard equipment. Write for descriptive literature. STANDARD PRESSED STEEL CO., Jenkintown 26, Pennsylvania.

HALLOWELL SHOP EQUIPMENT DIVISION
SPS
JENKINTOWN PENNSYLVANIA

How RHEEM cools off 500° lithographed metal in 5 minutes



Propellair fans do an effective job

Rheem Manufacturing Co. has one of the world's largest units for drying lithographed metal at their New Orleans Plant. The equipment, developed by Wagner Litho Machinery Division, roller coats, bakes and cools metal for 55-gallon drums—all in one continuous operation.

The problem of cooling the metal from 500° to room temperature and exhausting heat and fumes was solved by the installation of Propellair Fans (direct connected type). As shown in the drawing above, twenty-six 1 HP, 30-inch fans provide high velocity air movement over the coated metal . . . blowing heat and fumes into a tunnel. Here three 60" fans (each 15 HP, 79,000 CFM) with glass-insulated motors take over, exhausting heat and fumes high over the roof. Rheem reports this ventilating system does a most effective job, economically.

What's your ventilating problem?

For over 20 years Propellair has been solving tough air moving problems for leading companies. Propellair Fans are economical—in initial cost, in operating expense, in maintenance. Above all, they are rugged and dependable. Features include cast aluminum airfoil propellers, curved airfoil entrance rings, R & M motors, certified air deliveries.

Tell us your ventilating problem and our engineers will give you their recommendations, without obligation.

Write for Bulletin P-3238

PROPELLAIR®
DIVISION OF ROBBINS & MYERS, INC.
SPRINGFIELD · OHIO

of the refuse fuels handled successfully by these spreader stokers. More than 20 installations shown. Detroit Stoker Co.
See ad on page 35.

353 Axial Flow Blowers — Described in this bulletin are compact, axial flow positive pressure blowers for handling gas or air under pressure or vacuum. Blower-Stoker Div., Read Standard Corp.
See ad on page 164.

354 Tips on Plant Protection—Instructive information for engineers whose plants are engaged in defense production is furnished in this 16-pp manual. It is intended to solve plant protection problems by instituting security systems for preventing loss of life, damage to property. Training of personnel, planning of hourly routes, safety factors, fire prevention discussed. Detex Watchclock Corp.
See ad on page 4.

355 Solder Text—This 36-pp book is basically an editorial treatise. Separate sections are devoted to thermal effects, mechanical properties, principles of soldering and fluxes. Selection of proper solder for the job is explained, and fusible alloys described. Practical suggestions are provided, also technical data. Federated Metals Div., American Smelting and Refining Co.
See ad on page 179 for information on babbitts.

356 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets serves as handy guide to the selection of magnets. Dings Magnetic Separator Co.
See ad on page 124.

357 Overhead Doors and Operators — This 16-pp catalog on manufacturer's Overdoors and electric operating equipment explains and illustrates their outstanding features and describes standard models. Engineering data provided includes specifications, construction and installation details, and building requirements. Also touched upon in this practical book are special design doors, operators for sliding gates. Barber-Colman Co.
See ad on page 204.

To get these free catalogs, list item numbers of those wanted on the postage-free cards provided for you on pages 37-38 and 171-172

358 Regulating Valves — Bulletin 313 describes double seated diaphragm regulating valves for use with control instruments, outlining special features of the valves, particularly the "flow line" contoured body designed to provide high capacity at low pressure drop. Leslie Co.
See ad on page 200 for information on float-less level control.

359 Tough and Flexible—Information is offered on Dynaprene cord, designed for durability and resistance to abrasion and cutting. Tells other advantages of this flexible, flame retardant cord. Whitney Blake Co.
See ad on page 199.

360 Easy Silver Plating — This folder describes a powder for "on-the-job" plating of electrical contacts. Tells how it deposits a coat of silver that provides cool conductivity for copper, brass or bronze contacts. Includes sample. Cool-Amp.
See ad on page 196.

361 Floors for the Job—The merits of selecting the proper flooring for any industrial installation is stressed in this literature. Explains how company is set up to offer assistance in choosing flooring to meet individual plant needs. Kentile Inc.
See ad on page 165.

362 Unit Pillow Blocks — Literature is available on this manufacturer's newest pillow block featuring a Fairprene seal which retains lubricant, and set screws for easy installation. SKF Industries, Inc.
See ad on inside back cover.

363 Motors to Fit the Space—Company's Axial Air Gap motor designed for drive applications where space is limited is discussed in this literature. Stresses smaller size and lighter weight of the motor. Fairbanks, Morse & Co.
See ad on page 117.

364 Plastics Price Lists—Inventory price lists for No. 1 and 2 grades of acetate, vinyl, lucite and other plastics are available. Cadillac Plastic Co.
See ad on page 191.

"If you must smoke that cigar, take it over by the fume collector!"

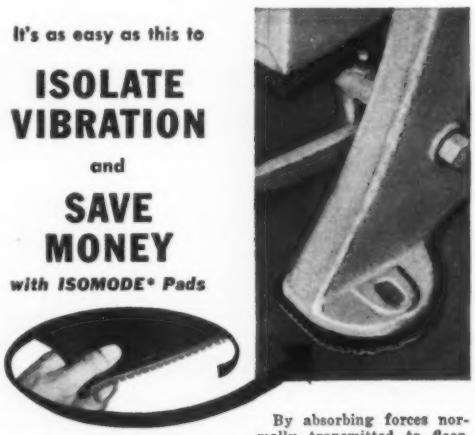
It's as easy as this to

ISOLATE VIBRATION

and

SAVE MONEY

with ISOMODE Pads*



Here's the durable mounting to absorb shock...reduce noise ...cut your maintenance costs. In hundreds of installations, the Isomode Pad has proved to be not only one of the most economical mounts, but also one which does a superior job of isolating vibration.

By absorbing forces normally transmitted to floor, Isomode Pads reduce building damage and undue deterioration of machinery. No bolting in most cases.

Made of oil, age- and water-resistant Du Pont Neoprene. Write for details – discover their surprisingly low cost.

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THE MB MANUFACTURING COMPANY, INC.
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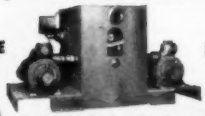
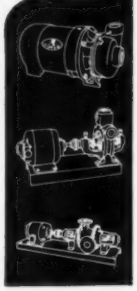
APCO *Packaged* CONDENSATION RETURN UNITS

for the SMALL LOW PRESSURE JOBS

10 to 40 lbs. with 8, 15, 30 Gallon Receivers



Packaged Duplex Condensation Return Unit with No. 4 Series Apco Pumps.



Start saving valuable heat units with APCO Square Tank Units. Built to meet demand for a smaller unit with the superb performance of our larger units. Remember, the Pumps are Apcos. No Vapor Binding — Special Provision for Expansion and Contraction — No Frictional Wear within pump. Thus, ECONOMY.

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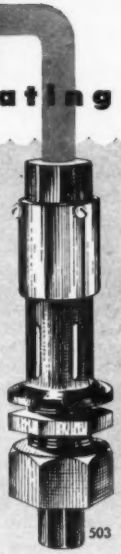
INEXPENSIVE water heating



Heat water in small tanks by direct injection of steam with the

SARCO THERMOTON TYPE S

It combines the function of a silent steam nozzle with approximate temperature control. Prevents boiling over; shuts off automatically when no water is drawn; conserves steam.

Sizes ½" to 2", pressures to 200 psi

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503

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Represented in Principal Cities
SARCO CANADA LTD., TORONTO 5, ONTARIO

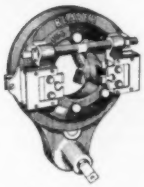
THINKING OF 2½ TO 4-INCH TOOLS?

Here's a Great Team!

For hand or power use

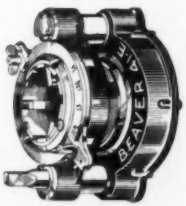
BEAVER 41-E THREADER 104 CUTTER

Beaver No. 104 Geared Square-end Knife Cutter cuts off square and clean without burr. Knives feed automatically — with safety guide ahead of cutting edge to prevent knife breakage. The No. 104 is ideal for cutting, grooving or beveling pipe. Furnished complete with operating ratchet.



No. 104

Beaver No. 41-E Geared Threader is fully adjustable for undersize and oversize threads of uniform length. Threads all sizes, 2½" to 4", with one set of dies! Fully-enclosed gear case! Furnished complete with operating ratchet.



No. 41-E

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210-300 DANA AVENUE
WARREN, OHIO · U. S. A.
"50 Years of Friendly Service"

THIS NEW SPRING!

Adds 50% to Safe Top Speeds of

LOVEJOY FLEXIBLE COUPLINGS

A new multiple leaf spring holds the collar in place—enables this Lovejoy Coupling to withstand considerably higher speeds with complete safety. Free-floating load cushions suspended between heavy metal jaws —no metal-to-metal power transmission. Instant adjustment for shock, vibration, surge, backlash and misalignment. No lubrication needed. Cushions available for every duty . . .1/6 to 2500 h.p.

WRITE TODAY FOR COMPLETE CATALOG AND QUICK-FINDING SELECTOR CHARTS

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SILVER PLATING

"ON THE JOB" WITH POWDER

Purposes of silver plating need not be explained to you of the electrical field.

The biggest problems of silver plating are its convenience, economy and thoroughness. "Cool-Amp" silver plating POWDER is the answer to these problems.

"Cool-Amp" deposits a genuine coat of silver that will not peel off and provides cool maximum conductivity for copper, brass or bronze contacts. It has been proven equal to any electroplating for bolted and stationary contacts and is far more adaptable . . . always ready for use.

"Cool-Amp" POWDER offers a quick and easy solution to heating due to oxidation, improves the continuity of electrical service and reduces maintenance.

"Cool-Amp" is completely harmless to the user and is simple to apply. It can be used by any number of people at the same time. ON THE JOB, in underground vaults and sub stations and in hard-to-get-at places. The only equipment needed is a sharp steel wire brush or abrasive cloth, clean rag and water.

Dampen a rag, dip in "Cool-Amp" and rub on surface. One pound will silver plate approximately 6000 square inches.

$13.50 PER POUND. SHIPPED PRE-PAID.

WRITE FOR FREE SAMPLE AND QUANTITY QUOTATIONS

GENUINE • SIMPLE SILVER PLATING

COOL-AMP

Dept. PE 8603 S. W. 17th Ave. • Portland 19, Oregon

TRY IT!

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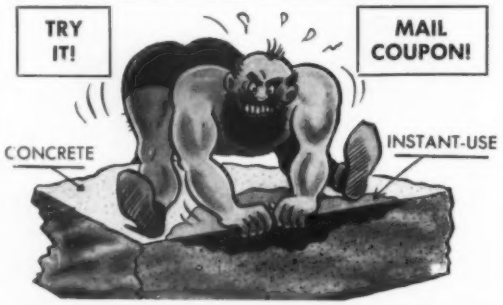

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Sets Instantly!

Repair broken factory floors without the usual traffic tie-up. Simply shovel INSTANT-USE into hole or rut—tamp smooth—truck over! No Waiting! INSTANT-USE bonds tight to old concrete—right up to a feather edge. It's tough. Wears like iron. Won't crack or crumble. Install complete overlay where floors are badly chewed up. Used indoors or out. Immediate shipment.

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Please send me complete INSTANT-USE information, details of TRIAL ORDER PLAN and HAND BOOK OF BUILDING MAINTENANCE—no obligation. (Clip and attach coupon to Co. letterhead.)

Name .....
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Are Shaft Currents Eating Up Your Motor Bearings?

(Continued from page 85)

itself from its support. This is done by using a fabric base phenolic material which would support the bearing bushing within the bearing enclosure. It would then not be exposed to accidental shorting. On pedestal bearing machines an insulating pad is placed underneath the bearing pedestal itself.

Watch Other Causes, Too

With all types of bearing insulation, one must be careful to determine that the bearing is not grounded by some unsuspected dowel pin, oil pipe, forced-feed oil lubrication system, or possibly a chain securing the cover for the oil ring inspection holes.

If it is suspected that a motor or generator has bearing trouble due to shaft current, a check may be made as follows: On a machine without insulated bearings, such as the smaller bracket bearing variety, take d-c millivolt readings between each end of the shaft and yoke.

Also take the readings from one end of the shaft to the other. If any voltage readings of about .01 or higher are obtained, shaft currents are likely to cause trouble. Where bearings are insulated, proceed as shown in Figure 4.

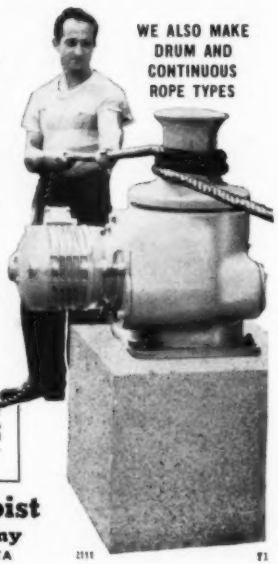
If this test shows there is defective insulation, it will be necessary to make further tests as shown in Figure 5 to determine whether the defect is in the oil piping, or in the pedestal, or in the bracket insulation.

Once the source of the trouble has been located, it can usually be remedied quite simply.

STOP WASTING MONEY on stalled freight cars!

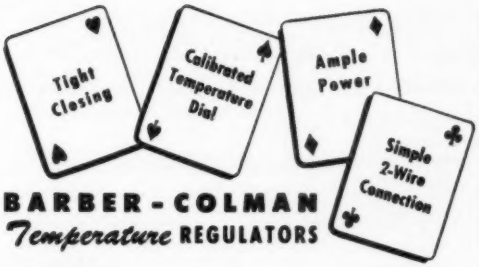
How much time and money have *you* lost this year, waiting for switch engines? Demurrage costs can really mount up fast. But you can pull them down fast with AMERICAN Electric Car Pullers. No waiting for a switcher. No "stand-by" charges. One man can move one or more rail cars at 40 to 45 feet per minute. Tackle many other jobs, too, with an AMERICAN Car Puller—bending steel, dragging loads, warping barges.

WE ALSO MAKE DRUM AND CONTINUOUS ROPE TYPES



WRITE FOR FREE BOOKLET showing full line. Contains tables to help you figure line pull needed for your types of cars, with curvature and grade factors.

American Hoist & Derrick Company
SAINT PAUL 1, MINNESOTA



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Temperature **REGULATORS**

"Ace High" is the expression sometimes used to describe the operating efficiency and accuracy of Barber-Colman Temperature Regulators. There's plenty of good reason, too! — with such features as *tight closing, calibrated temperature dial, AMPLE POWER,* and *simple 2-wire connection.* You can't "beat" these Regulators for accuracy, economical maintenance, and ease of installation. Available in two standard ranges — 50° to 130° and 120° to 200°.

WRITE TODAY for complete information on Barber-Colman Temperature Regulators. Bulletin F-4695 will be sent promptly.

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THE LIQUIDOMETER CORP.
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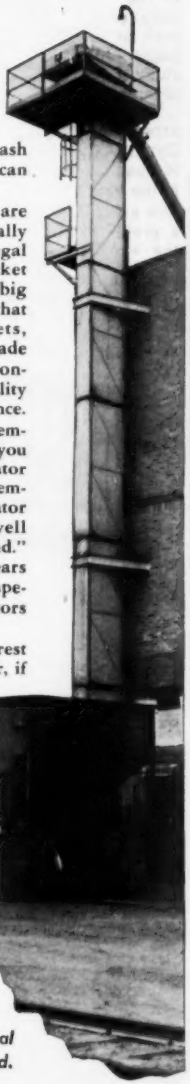
Give yourself a raise!



Saving money can be the same thing as giving yourself a raise, and with Rex® Standard Bucket Elevators the cost of "raising" coal, gravel, crushed limestone, foundry sand, wood chips, soda ash or any other free-flowing material can be substantially reduced.

Rex Standard Bucket Elevators are made in 3 basic designs to fit virtually every type of service . . . Centrifugal Discharge type, Continuous Bucket type and Super Capacity type. The big advantages you get with Rex are that all major components — buckets, chains, sprockets, housing—are made by Chain Belt Company. One responsibility . . . one high standard of quality . . . one sure measure of performance.

Another important point to remember is that when you specify Rex, you get the help of trained bucket elevator specialists . . . men who devote themselves exclusively to bucket elevator problems and are particularly well qualified to give you a "helping hand." They have behind them over 40 years of experience to help solve those special problems where standard elevators are not suitable.

For all the facts, call your nearest Rex Field Sales Engineer today; or, if you prefer, write to Chain Belt Company, 4777 W. Greenfield Ave., Milwaukee 1, Wis.

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PLANNING AND DEVELOPING the Company Organization Structure by E. Dale. Size 6 by 9 in.; 232 pp including index; cloth bound. Published by American Management Association, 330 West 42nd St., New York, N. Y. Price $4.50.

WHAT IS meant by company organization? How do individuals function within an organization singularly and in a body? Where do committees come in? What are some of the different types of organizational set-ups? Answers to questions such as these can be found in the pages of this interesting research study along with other details on organization.

The main portion of the book is arranged in two parts namely "The Dynamics of Organization" and "The Mechanics of Organization." Some of the topics covered in the first section are: delegating responsibility—a problem of personality; reducing the executive burden — the staff assistant; delegation of decision-making-decentralization.

Construction of the ideal organization, putting the organization plan into effect, the organization chart and gaining the acceptance of the plan are some of the topics covered in the second section.

One of several items carried by the appendices is a description of top management jobs. A twelve page bibliography of useful management information appears in the back section of the book.

Electronics

PROCEEDINGS OF THE NATIONAL ELECTRONICS CONFERENCE. Size 6¼ by 9¼ in.; 607 pp; illustrated; cloth bound. Published by National Electronics Conference, Inc., 852 East 83rd St., Chicago 19, Ill. Price $5.00.

PAPERS and digests of papers which were presented at the 1951 electronics conference in Chicago are offered by this book. Material covered is, generally, of a highly technical nature.

Seventy-nine papers were used to compile this volume. These cover a wide range of subjects in the study of electronics. Some of these are: audio systems; analog computers; magnetic amplifiers; medical applications; industrial applications; industrial inspection and measurement.

The appendices section of the book carries the contents of six previous volumes, reporting on conferences of other years.

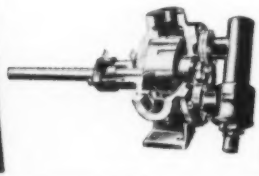
Engineering-Management Communication

HOW TO IMPROVE ENGINEERING-MANAGEMENT COMMUNICATIONS prepared by the National Society of Professional Engineers. Size 6 by 9 in.; 46 pp; illustrated; paper bound. Published by the National Society of Professional Engineers, 1121 Fifteenth St., N.W., Washington 5, D. C. Price $2.00 to non-members, $1.00 to members.

THIS REPORT is a result of a survey response from some 350 companies employing more than 45,000 engineers and operating 1,000 plants. It is quite thorough in its coverage and despite its size presents an excellent experience on the subject. The booklet lends itself to comparatively easy, understandable and informative reading.

Among the seven chapters found in this publication are the following: what engineers want to know about management policy; developing management potential in trained engineers; how management gets the

VIKING
FEATURES THAT MAKE FOR GOOD PUMPING



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2. **SELF PRIMING** on suction lifts up to 20 feet or vaporization limits on volatile liquids. Smooth, even discharge. No pulsation.

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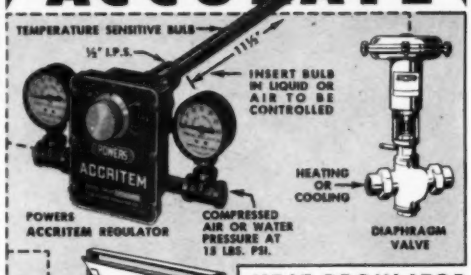
ACCURATE



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Unsurpassed for reliability and power to operate large or small diaphragm valves for accurate temperature control of Water Heaters, Heat Exchangers, Jacket Water for Compressors, Diesel and Gas Engines, and many industrial processes.

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● *Adjustable Sensitivity* and over-heat protection. ● *Calibrated Dial* temperature adjustment. ● *Ranges* 50 to 250° F. and 150 to 350° F. ● *Simple, Rugged Construction* withstands vibration and insures many years of reliable service. Requires 15 lb. supply of compressed air or water for its operation. ● *Small Size* — regulator head is only 2⅞" x 3⅛". Write for Bulletin 316. (a76)

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60 Years of Temperature and Humidity Control • Offices in Over 50 Cities

Tell Us Your Production Problems . . . We'll Help You Solve Them

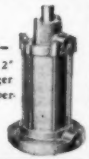
"LOGAN" HYDRAULIC CYLINDERS

SAVE TIME · EFFORT · MOTION Here's fast-acting, positive controlled power for all types of industrial applications.

LOGAN 750 SERIES

ROTATING TYPE—Seven standard sizes from 3" to 14" diameter bore. Larger sizes special to order. Maximum operating pressure 500 p.s.i.

NON-ROTATING TYPE—Eight standard sizes from 2" to 8" diameter bore. Larger sizes special. Maximum operating pressure 750 p.s.i.



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- HYDRAULIC CONTROL VALVES — CATALOG 200-4
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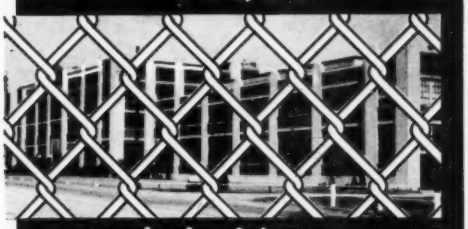
FLUID POWER SPECIALISTS SINCE 1916

REALOCK FENCE



gives **locked-in** protection

All fittings on Realock Fence have bolts so placed that nuts cannot be removed from the outside. This means that Realock Fence provides *added protection* for your grounds and property . . . effectively discourages tampering by would-be trespassers.

Strongly constructed, Realock Fence has high resistance to the elements because of a special galvanizing process . . . gives permanent protection and trouble-free service year after year. For additional information write our nearest sales office or consult your classified telephone directory.

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DYNAPRENE is the extra tough flexible cord that can get you out of a tight corner when other cords have failed. It is jacketed with a special neoprene compound, vulcanized by the continuous steam cure process, and exceeds Underwriters' requirements for SO, SJO and SV-type neoprene cordage.

HERE ARE OTHER ADVANTAGES

- Accurate centering
- Even cure
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- Greater flexibility
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For a sample of DYNAPRENE simply write on your business stationery telling us the use you plan for it.

Be sure to specify Whitney Blake type SO, SJO or SV-type neoprene jacket for your flexible cord requirements.

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opinions of its engineers and how to improve communications—summary and recommendations.

A highlight of one of the chapters is a discussion of the new meeting technique—Phillips 6-6—developed by Professor D. Phillips of Michigan State College. Also, a page of suggested readings on communications is found in the back of the booklet.

On Insurance

Insurance Series. Size 6 by 9 in.; paper bound. Published by American Management Association, 330 W. 42nd St., New York 18, N. Y.

INSURANCE NEEDS IN A PREPAREDNESS ECONOMY, booklet No. 90, price $1.25, 44 pp. This booklet covers papers presented at an A.M.A. conference in May 1951. These are: war damage corporation and its meaning to insurance; insurance needs under defense contracts; the impact of inflation on the insurance industry and insurance practice. A panel session on the adequacy of current insurance is included.

PROTECTING COMPANY ASSETS AND EARNINGS: New Opportunities for the Insurance Buyer, booklet No. 91, price $1.25, 40 pp. Business interruption problems in company operations today, new fields of potential loss, and analysis of multiple location plans are the insurance conference papers covered by this booklet.

Engineering Laboratory

MECHANICAL ENGINEERING LABORATORY by Charles W. Messersmith and Cecil F. Warner. Size 8½ by 11 in.; 160 pp; illustrated; cardboard covered and plastic bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y. Price $3.50.

THIS BOOK has been developed from notes prepared for the students of Purdue University. Material usually covered in thermodynamics and heat power textbooks has been omitted wherever possible.

The first chapter emphasizes the procedure and method of working up data from an experiment and presenting the results clearly and accurately in a report. Other sections are given to: pressure measurements; heating value of fuels; analysis of flue gas; stationary steam generating units; steam driven prime movers; heat transfer; internal combustion engines and vapor compression refrigeration plants.

Although primarily intended for college use, the book should be of interest to many practicing engineers because the various experiments illustrate fundamental principles. It includes data on many of the devices and instruments used in power plants. The book also brings out quite clearly the reasons why these laboratory tests are being made.

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Engineering Refresher Notes

REFRESHER NOTES — Hydraulics, Thermodynamics, Machine Design for Professional Engineer's License Examination by John D. Constance. Third edition; size 8½ by 11 in.; 300 pp; illustrated; paper bound. Published by the author, John D. Constance, 625 Hudson Terrace, Cliffside Park, N. J. Price $4.50.

A REVIEW of engineering principles along with problem solutions pertaining to three divisions of study are presented by the author as an aid in preparing for examinations leading to professional status. Each of the three sections carry typical problems taken from previous examinations.

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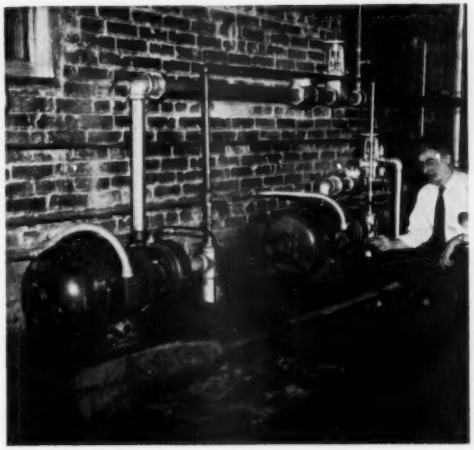

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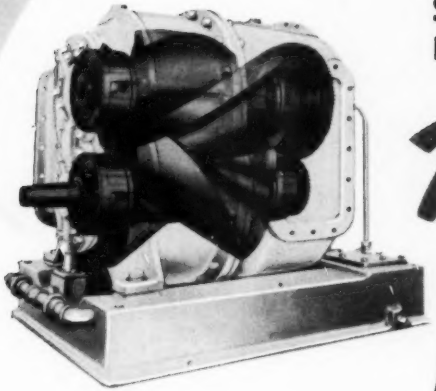

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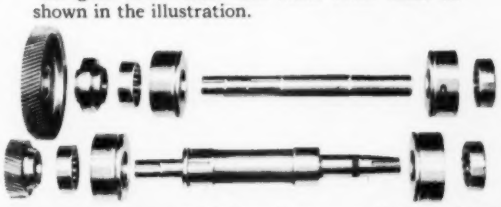

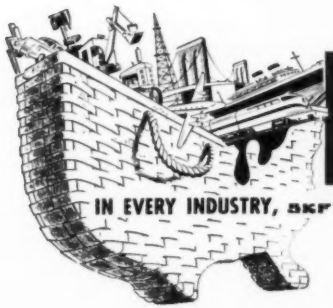

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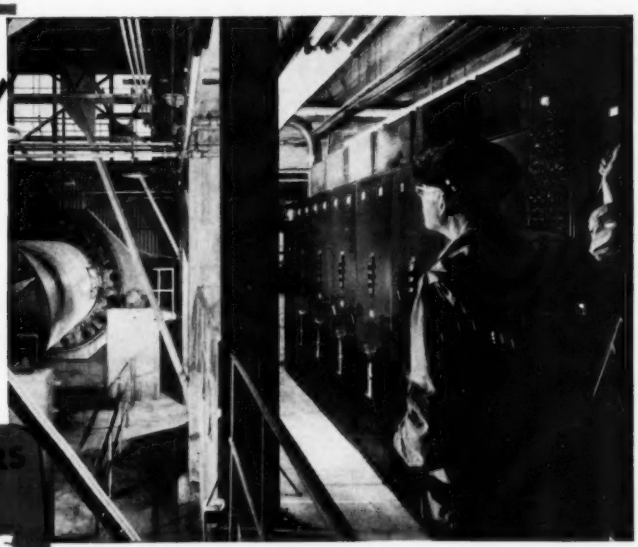

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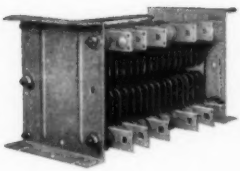
A-3671

THESE STARTERS are designed to control the motors driving this high inertia load. They are full magnetic wound-rotor motor controllers. All the operator does is push the "start" button. Acceleration is automatic.



HEAVY DUTY RESISTOR BANKS in the motor secondary circuit cut down current inrush. Time delay relays allow the proper interval of time for each accelerating contactor to close and cut out resistance in successive steps.

WHEN 2500 TO 5000-VOLT lines are available, select Type H Starters for similar jobs. Current-limiting fuses, safety interlocks, meters, relays . . . everything needed for your application is built in. Ask for Bulletin 14B6410A.

ALLIS-CHALMERS

There are Allis-Chalmers controllers for use in every industry . . . starters for squirrel-cage, wound-rotor and synchronous motors. For starters to 2500 hp and up to 5000 volts — check with your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wisconsin, for bulletins.

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